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TRANSACTIONS

OF

THE FIRST PAN-AMERICAN MEDICAL CONGRESS,

HELD IN

THE CITY OF WASHINGTON, D. C., U. S. A.,

SEPTEMBER 5, 6, 7, AND 8, A. D. 1893.

IN TWO PARTS.

PART I.

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Resolved by the Senate (the House of Representatives concurring), That there be printed and bound in cloth, of the proceedings of the Pan-American Medical Congress, held in Washington City in September, 1893, under the authority of a joint resolution of Congress approved July 18, 1892, 10,000 copies; of which 2,000 shall be for the use of the Senate, 4,000 for the use of the House of Representatives, and 4,000 for distribution by the Department of State; the same to be indexed under the direction of the Committee on Printing.

LETTER OF THE SECRETARY GENERAL OF THE CONGRESS.

CINCINNATI, OHIO, *November 25, 1893.*

DEAR SIR: I have the honor to transmit herewith the Transactions of the First Pan-American Medical Congress, held in the city of Washington, D. C., September 5, 6, 7, and 8, A. D. 1893, pursuant to the invitation issued by the President of the United States to the various American countries in accordance with the joint resolution of Congress approved July 18, A. D. 1892.

I have the honor to be, sir, very sincerely, yours,

CHARLES A. L. REED,
Secretary-General.

Hon. WALTER Q. GRESHAM,
Secretary of State, Washington, D. C.

Approved:
WILLIAM PEPPER,
President.

FORM OF INVITATION ISSUED BY THE PRESIDENT OF THE UNITED STATES.

DEPARTMENT OF STATE,
Washington, October, 1892.

SIR: The American Medical Association, which is the great national organization of the medical profession of the United States, has authorized an invitation to the medical profession of all countries of the western hemisphere to a Pan-American medical congress, to be held in the city of Washington, September 5, 6, 7, 8, 1893, and a joint resolution of Congress, approved July 18, 1892, authorized and requested the President to invite the several governments concerned to send official delegates to that congress.

The purposes of this congress are to promote the closer relations between the medical profession of the various participating countries, and it is confidently believed that such a congress can not fail to result in important intellectual and material benefits.

The sections for consideration are as follows:

1. General medicine.
2. General surgery.
3. Military medicine and surgery.
4. Obstetrics.
5. Gynecology and abdominal surgery.
6. Therapeutics.
7. Anatomy.
8. Physiology.
9. Diseases of children.
10. Pathology.
11. Ophthalmology.
12. Laryngology and rhinology.
13. Otology.
14. Dermatology and syphilography.
15. Orthopædics.
16. Hygiene, climatology, and demography.
17. Marine hygiene and quarantine.
18. Diseases of the mind and nervous system.
19. Oral and dental surgery.
20. Medical pedagogics.
21. Medical jurisprudence.
22. Railway surgery.

Indeed, from the foregoing, it may be positively stated that the scope of the deliberations of the body will be more extensive than in any previous similar congress, while the subjects that will come before several of these sections, such, for example, as that embraced in No. 17—marine hygiene and quarantine—will lead to results of special importance in their bearing upon the reciprocal relations between the countries participating.

The official languages of the congress will be English, Spanish, Portuguese, and French.

In order to secure the complete success of the congress, it is under-

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stood that a systematic organization has been effected of the medical profession in all of the countries interested, but it is of the utmost importance that there shall be present at the congress from each country a certain number of official delegates.

It is the wish of the President that you promptly bring this invitation to the knowledge of the government to which you are accredited and urge upon it the pleasure it would afford him to learn of its acceptance and of the appointment of official delegates, not exceeding 6 in number.

It is the intention of the Government of the United States to be represented in the proposed congress by 6 delegates. Of course, liberty of action as to the number each State may decide to appoint is freely accorded, but it is hoped the maximum number will not be exceeded.

I am, sir, your obedient servant,

JAMES G. BLAINE,
Secretary of State.

THOMAS RYAN, ESQ.,
U. S. Minister, City of Mexico.

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PART I.

ORGANIZATION.
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GENERAL SESSIONS.
ADDRESS OF THE PRESIDENT OF THE CONGRESS.

PRELIMINARY ORGANIZATION OF THE CONGRESS.

OFFICE OF THE PERMANENT SECRETARY
OF THE AMERICAN MEDICAL ASSOCIATION,
Philadelphia, June 4, 1891.

To the Medical Profession of the Western Hemisphere:

At the meeting of the American Medical Association, held at Washington May 5, 1891, Dr. Charles A. L. Reed, of Cincinnati, introduced the following:

Resolved, That the American Medical Association hereby extends a cordial invitation to the Medical Profession of the Western Hemisphere to assemble in the United States in an Inter-Continental American Medical Congress.

Resolved, That the Committee on Nominations be, and is hereby, instructed to nominate one member for each State and Territory, and one each from the Army, Navy, and Marine-Hospital Service, who shall constitute a committee, which is hereby instructed to effect a permanent organization of the proposed Inter-Continental American Medical Congress and to determine the time and place at which the same shall be held.

The resolutions were seconded by Dr. Wm. H. Pancoast and others and unanimously adopted.

Pursuant to the foregoing, the following committee was nominated and elected:

Alabama—W. H. Sanders, M. D.
Arizona—Henry A. Hughes, M. D.
Arkansas—Ed. Bentley, M. D.
California—W. R. Cluness, M. D.
Colorado—Wm. A. Campbell, M. D.
Connecticut—C. A. Lindsley, M. D.
Delaware—C. H. Richards, M. D.
District of Columbia—D. W. Prentiss, M. D.
Florida—C. R. Oglesby, M. D.
Georgia—J. McFadden Gaston, M. D.
Idaho—Geo. P. Haley, M. D.
Illinois—N. S. Davis, M. D.
Indiana—A. M. Owen, M. D.
Iowa—B. H. Criley, M. D.
Kansas—J. E. Minney, M. D.
Kentucky—J. N. McCormack, M. D.
Louisiana—Stanford E. Chaillé, M. D.
Maine—Hampton E. Hill, M. D.
Maryland—Geo. H. Rohé, M. D.
Massachusetts—Augustus P. Clarke, M. D.
Michigan—C. Henri Leonard, M. D.
Minnesota—P. H. Millard, M. D.
Mississippi—W. T. Kendall, M. D.
Missouri—I. N. Love, M. D.
Montana—Thos. J. Murray, M. D.
Nebraska—R. C. Moore, M. D.
Nevada—P. J. Aiken, M. D.
New Hampshire—Irving A. Watson, M. D.
New Jersey—E. J. Marsh, M. D.
New Mexico—C. E. Winslow, M. D.
New York—John Cronyn, M. D.
North Carolina—H. Longstreet Taylor, M. D.
North Dakota—E. M. Darrow, M. D.

ORGANIZACIÓN PRELIMINAR DEL CONGRESO.

OFICINA DEL SECRETARIO PERMANENTE
DE LA ASOCIACIÓN MÉDICA AMERICANA,
Filadelfia, junio 4 de 1891.

A los Señores profesores de medicina del Hemisferio Occidental:

En junta de la Asociación Médica Americana, celebrada en Washington el 5 de mayo de 1891, el Dr. D. Carlos A. L Reed, de Cincinati, hizo las propuestas siguientes:

Primera: Que la Asociación Médica Americana dirige cordial invitación á los Señores profesores de medicina del Hemisferio Occidental para reunirse en los Estados Unidos, formando un Congreso Médico Americano Intercontinental.

Segunda: Que la Comisión de Designaciones quede notificada para que nombre un vocal para cada Estado y Territorio, y para cada uno de los cuerpos del Ejército, Marina y Servicio de Hospitales Marítimos, los cuales constituirán una comisión que lleve á debido efecto la organización permanente del propuesto Congreso Médico Americano Intercontinental, fijando la época y el lugar en que haya de reunirse.

Habiendo sido apoyadas estas propuestas por el Dr. Wm. H. Pancoast y otros Señores, fué unánimemente adoptada.

De conformidad con lo expuesto, fueron designados los Señores siguientes, doctores en medicina:

Alabama—W. H. Sanders.
Arizona—Henry A. Hughes.
Arkansas—Ed. Bentley.
California—W. R. Cluness.
Colorado—Wm. A. Cámpbell.
Connecticut—C. A. Lindsley.
Delaware—C. H. Richards.
Distrito de Columbia—D. W. Prentiss.
Florida—C. R. Oglesby.
Georgia—J. McFadden Gaston.
Idaho—Geo. P. Haley.
Illinois—N. S. Davis.
Indiana—A. M. Owen.
Iowa—B. H. Criley.
Kansas—J. E. Minney.
Kentucky—J. N. McCórmack.
Luisiana—Stanford E. Chaillé.
Maine—Hampton E. Hill.
Maryland—Geo. H. Rohé.
Massachusets—Augusto P. Clarke.
Michigan—C. Henri Léonard.
Minnesota—P. H. Millard.
Misisipi—W. F. Kéndall.
Misuri—I. N. Love.
Montana—Tom. J. Murray.
Nebraska—R. C. Moore.
Nevada—P. J. Aiken.
Nueva Hampshire—Irving A. Watson.
Nueva Jersey—E. J. Marsh.
Nueva Méjico—C. E. Winslow.
Nueva York—Juan Cronyn.
Carolina del Norte—H. Lóngstreet Táylor.
Dakota del Norte—E. M. Darrow.

Ohio—Charles A. L. Reed, M. D.
Oregon—Wm. Boys, M. D.
Pennsylvania—Wm. Pepper, M. D.
Rhode Island—Geo. L. Collins, M. D.
South Carolina—R. A. Kinloch, M. D.
South Dakota—J. W. Freeman, M. D.
Tennessee—J. R. Buist, M. D.
Texas—J. W. Carhart, M. D.
Utah—F. S. Bascom, M. D.
Vermont—H. D. Holton, M. D.
Virginia—J. S. Wellford, M. D.
Washington—J. M. Morgan, M. D.
West Virginia—J. H. Brownfield, M. D.
Wisconsin—J. T. Reeve, M. D.
Wyoming—J. H. Finfrock, M. D.
U. S. Army— ——— ———.
U. S. Navy— ——— ———.
U. S. Marine-Hospital Service—J. B. Hamilton, M. D.

WM. T. BRIGGS, M. D.,
President.
WILLIAM B. ATKINSON, M. D.,
Permanent Secretary.

BY THE CONGRESS OF THE UNITED STATES.

JOINT RESOLUTION to authorize the President to invite certain governments to send delegates to the Pan-American Medical Congress.

A joint resolution was unanimously adopted by the Senate June 3, 1892, concurred in by the House of Representatives July 14, 1892, and approved July 18, 1892, by which the President was authorized and requested to invite the several governments of the Western Hemisphere to send official delegates to the meeting of the Pan-American Medical Congress to be held in the city of Washington September 5, 6, 7, and 8, A. D. 1893.

PRELIMINARY REPORT (AD INTERIM) OF THE COMMITTEE ON ORGANIZATION.

DEAR DOCTOR: On behalf of the committee appointed by the American Medical Association May 5, 1891, "to effect a permanent organization of an Inter-Continental American Medical Congress," I beg leave to report that the work has been prosecuted as diligently as possible. A series of regulations, hereby submitted, has been adopted and an organization in accordance therewith has been effected, in some degree, in all of the constituent countries except Paraguay. In several countries the organization has been completed in accordance with the regulations, while in some instances full lists of secretaries have been secured; in others honorary chairmen only have been furnished, while in still others the organization has not advanced beyond the appointment of a member of the international executive committee. The lists of officers are, however, sufficiently complete to furnish channels through which the necessary preliminary correspondence of the sections may be inaugurated. In view of this, and the additional fact that a considerable time is necessary for the interchange of letters with some of the remoter countries, the committee deems it expedient to submit for promulgation this preliminary announcement of the congress.

Ohio—Carlos A. L. Reed.
Oregon—Wm. Boys.
Pensilvania—Wm. Pépper.
Rhode Island—Geo. L. Collins.
Carolina del Sur—R. A. Kinloch.
Dakota del Sur—J. W. Freeman.
Tenesi—J. R. Buist.
Tejas—J. W. Cárhart.
Utah—F. S. Báscom.
Vermont—H. D. Holton.
Virginia—J. S. Wéilford.
Washington—J. M. Morgan.
Virginia del Oeste.—J. H. Brównfield.
Wisconsin—T. Reeve.
Wyoming—J. H. Finfrock.
U. S. Army.— ——— ———.
U. S. Navy.— ——— ———.
U. S. Marine-Hospital Service—J. B. Hámilton.

WM. F. BRIGGS,
Doctor en Medicina, Presidente.
GUILLERMO A. ATKINSON,
Doctor en Medicina, Secretario Permanente.

CONGRESO DE LOS ESTADOS UNIDOS.

ACUERDO UNIDO autorizando al Presidente de los Estados Unidos para invitar á ciertos gobiernos á enviar delegados al Congreso Médico Pan-Americano.

Se acuerda en acta por el Senado y Cámara de Representantes de los Estados Unidos de América, reunidos en Congreso, que el Presidente de los Estados Unidos, sea, y está por ésta, autorizado y suplicado, para que invite á los diferentes gobiernos del Hemisferio Occidental, para que envien delegados oficiales á la junta del Congreso Médico Pan-Americano, que ha de celebrarse en la ciudad de Washington en los dias cinco, seis, siete y ocho de setiembre del año del Señor mil ochocientos noventa y tres.

INFORME PRELIMINAR (AD INTERIM) DE LA COMISIÓN DE ORGANIZACIÓN.

MUY SOR. MIO: En nombre de la Comisión designada por la Asociación Médica Americana en mayo 5 de 1891, "para llevar á efecto la organización permanente del Congreso Médico Americano Intercontinental," tengo el honor de poner en su conocimiento que los trabajos han adelantado con toda la diligencia posible. Una serie de artículos reglamentarios, que se acompañan, ha sido aprobada, efectuándose de conformidad, hasta cierto punto, la debida organización en todos los paises constituyentes, con excepción del Paraguay. En varios países la organización se ha completado sobre las bases de los Reglamentos, en algunos otros se ha obtenido llenar las nóminas de los Secretarios, al paso que de otros sólo se han conseguido los Presidentes Honorarios, sin que falten algunos, cuya organización no va más allá de la designación de un vocal de la Comisión Ejecutiva Internacional. Las nóminas de Presidentes y Secretarios son, sin embargo, suficientes á abrir sendas por las cuales se inaugure la debida correspondencia preliminar de las secciones. En vista de esto, y siendo, además, considerable el tiempo que se requiere para la comunicacion postal con algunos de los países más distantes, juzga la Comisión conveniente proponer la publicación de este anuncio preliminar del Congreso.

The committee entertains the hope that the organization may be completed in each of the constituent countries, in accordance with the regulations, before the meeting of the congress.

Respectively submitted on behalf the committee.

CHARLES A. L. REED,
Chairman of the Committee on Permanent Organization and Secretary-General of the Congress.

DR. HUNTER MCGUIRE,
President of the American Medical Association, Richmond, Va.

CINCINNATI, *September 5, 1892.*

RICHMOND, VA., *October 6, 1892.*

DEAR DOCTOR: I am in receipt of the report of the committee on organization of the Pan-American Medical Congress, transmitting the Preliminary Announcement of the Organization. Permit me to state that I am gratified to note the completeness of the work which has already been accomplished by your committee, and that, for, the reasons stated in your letter, I deem the immediate publication of the preliminary announcement imperative to the success of the congress.

With the assurance that the American Medical Association will do all in its power to promote the interests of the meeting at Washington in September of next year,

Very sincerely, yours,

HUNTER MCGUIRE,
President of the American Medical Association.

DR. CHARLES A. L. REED,
Chairman of the Committee on Permanent Organization of the Pan-American Medical Congress.

GENERAL REGULATIONS.

TITLE.

1. This organization shall be known as The Pan-American Medical Congress, and shall meet once in —— years.

MEMBERSHIP.

2. Members of the congress shall consist of such members of the medical profession of the Western Hemisphere, including the West Indies and Hawaii, as shall comply with the special regulations regarding registration, or who shall render service to the congress in the capacity of foreign officers.

OFFICERS.

3. The executive officers of the congress shall be residents of the country in which the congress shall be held, and shall consist of one president, such vice-presidents as may be determined by special regulations, one treasurer, one secretary-general, and one presiding officer and necessary secretaries for each section, all of whom shall be elected by the committee on organization, and there shall be such foreign vice-presidents, secretaries, and auxiliary committees as are hereinafter designated.

THE COMMITTEE ON ORGANIZATION.

4. The committee on organization shall be appointed by the representative medical association of the country in which the congress shall meet. This committee

La Comisión concibe la esperanza de que se hallará la organización completa en cada uno de los países constituyentes, de conformidad con los Reglamentos, antes de la apertura del Congreso.

Con todo respeto se somete este informe en nombre de la Comisión.

CARLOS A. L. REED,
Presidente de la Comisión de Organización Permanente y Secretario General del Congreso.

Al DR. HÚNTER MCGUIRE,
Presidente de la Asociación Médica Americana, Richmond, Va.

CINCINATI, *setiembre 5 de 1892.*

RICHMOND, VA., *octubre 6 de 1892.*

MUY SR. MIO: He recibido el informe de la Comisión de Organizacion del Congreso Médico Pan-Americano, transmitiendo el Anuncio Preliminar de la Organización. Tengo el gusto de manifestar á Usted mi satisfacción por lo completo del trabajo llevado á cabo por la Comisión, siendo del parecer de Usted sobre que la pronta publicación del Anuncio Preliminar es de absoluta necesidad para el buen éxito del Congreso.

Con la seguridad de que la Asociación Médica Americana hará todo lo posible para promover los intereses de la junta que ha de celebrarse en Washington en setiembre del año próximo,

Soy de Usted S. S.,

HÚNTER MCGUIRE,
Presidente de la Asociación Médica Americana.

DR. CARLOS A. L. REED,
Presidente de la Comisión de Organización Permanente del Congreso Médico Pan-Americana.

REGLAMENTO GENERAL.

TÍTULO.

1. Esta organización será conocida con el nombre de El Congreso Médico Pan-Americano, y se reunirá una vez cada —— años.

MIEMBROS.

2. Serán considerados miembros del Congreso todos los Señores profesores de medicina del Hemisferio Occidental, incluyendo las Antillas y Hawaii, que acepten los reglamentos especiales de asiento, ó presten al Congreso servicios como Empleados Extranjeros.

JUNTA DIRECTIVA.

3. La Junta Directiva del Congreso se compondrá de residentes del país en que se instale el Congreso, y consistirá en un Presidente, el número de Vice-Presidentes que se designe por artículo especial, un Tesorero, un Secretario General, con un Presidente y los Secretarios necesarios para cada sección, todos los cuales serán elegidos por la Comisión de Organización; y habrá, además, el número de Vice-Presidentes, Secretarios y Comisiones Auxiliares que en lo adelante se designarán.

COMISIÓN DE ORGANIZACIÓN.

4. La Comisión de Organización será nombrada por la asociación médica representativa del pais en que se reunirá el Congreso. Esta Comisión elegirá la Mesa del

shall select all domestic officers of the congress, and shall, at its discretion, confirm all nominations by members of the international executive committee, and, in the event that any member of the international executive committee shall fail to nominate by the time specified by special regulation, the committee on organization shall elect officers for the country thus delinquent. It may appoint vice-presidents and auxiliary committeemen in foreign countries, independently of nominations by the members of the international executive committee. It shall appoint auxiliary committees, arrange for the meeting, and frame special regulations for the session of congress for which it was appointed. It shall make a report of its transactions to the opening session of the congress.

THE INTERNATIONAL EXECUTIVE COMMITTEE.

5. There shall be an international executive committee, which shall be appointed by the first committee on organization and which shall consist of one member for each constituent country. This committee shall hold permanent tenure of office, except that when a member shall fail to be present at a meeting of the congress his office shall be declared vacant and the vacancy be filled by election held by the registered members from the country from which he was accredited. In the event of no representation whatever from the country in question, the members of the international executive committee present shall determine what disposition shall be made of the office.

It shall be the duty of each member of the international executive committee to nominate, from the medical profession of his country, one vice-president for the congress and one secretary for each section of the congress, and to forward the same to the chairman of the committee on organization; except that in any country in which the congress shall meet, it shall be the duty of the member of the international executive committee for that country to request his representative national medical association to appoint a committee on organization, which committee on organization shall discharge the duties designated in Regulation IV. Members of the international executive committee shall also nominate such auxiliary committees, and shall furnish such information as the committee on organization may request.

INCORPORATION.

6. The committee on organization may, at its discretion, cause the congress to be incorporated, which incorporation shall hold only until the final disbursement of funds for the session held in that particular country. In the event of such incorporation, such additional officers shall be elected and in such manner as may be required by law.

CONSTITUENT COUNTRIES.

7. The following shall be considered as the constituent countries of the Pan-American Medical Congress:

Argentine Republic, Bolivia, Brazil, British North America, British West Indies (including British Honduras), Chile, Dominican Republic, Honduras (Spanish), Mexico, Nicaragua, Paraguay, Peru, Salvador, Republic of Colombia, Republic of Costa Rica, Ecuador, Gautemala, Haiti, Kingdom of Hawaii, Spanish West Indies, United States, Uruguay, Venezuela, Danish, Dutch, and French West Indies.

SECTIONS.

8. The sections of the congress shall be as follows:

(1) General Medicine, (2) General Surgery, (3) Military Medicine and Surgery, (4) Obstetrics, (5) Gynæcology and Abdominal Surgery, (6) Therapeutics, (7) Anatomy, (8) Physiology, (9) Diseases of Children, (10) Pathology, (11) Ophthalmology, (12) Laryngology and Rhinology, (13) Otology, (14) Dermatology and Syphilography,

Congreso interior, y quedará á su discreción confirmar todo nombramiento hecho por los miembros de la Comisión Ejecutiva Internacional, y en el caso de que algún miembro de la Comisión Ejecutiva Internacional dejare de hacer las designaciones dentro del tiempo señalado por los reglamentos, la Comisión de Organización hará la elección para el país remiso. Está en sus atribuciones designar Vice-Presidentes y Vocales de Comisiones Auxiliares en países extranjeros con independencia de nombramientos hechos por miembros de la Comisión Ejecutiva Internacional. Formará Comisiones Auxiliares, preparará la junta, y dispondrá reglamento especial para la sesión del Congreso para que fué designada. En la sesión de apertura del Congreso presentará informe sobre sus actos.

COMISIÓN EJECUTIVA INTERNACIONAL.

5. Se formará una Comisión Ejecutiva Internacional, que será constituida por la primera Comisión de Organización, y que consistirá de un vocal para cada país constituyente. Esta Comisión será permanente en sus funciones; pero si alguno de los vocales dejase de asistir á una junta del Congreso, su empleo será declarado vacante, y ocupará su plaza el designado por elección de los miembros del país correspondiente. En el caso en que el país en cuestión no estuviese en ningún modo representado, los vocales de la Comisión Ejecutiva Internacional determinarán lo que haya lugar para disponer de la vacante.

Será de obligación de cada uno de los vocales de la Comisión Ejecutiva Internacional designar de entre los profesores de medicina de su país, un Vice-Presidente para el Congreso y un Secretario para cada una de sus secciones, dando cuenta al Presidente de la Comisión de Organización. Pero en cualquier país en que se celebrare el Congreso, será de obligación del vocal de la Comisión Ejecutiva Internacional por cada país suplicar á su asociación médica nacional representante que señale una Comisión de Organización, la cual se hará cargo de las incumbencias prescriptas en el Artículo IV. Los vocales de la Comisión Ejecutiva Internacional designarán asimismo semejantes Comisiones Auxiliares, y darán los informes que pida la Comisión de Organización.

INCORPORACIÓN.

6. La Comisión de Organización está autorizada, si lo creyere conveniente, á hacer que el Congreso posea existencia legislativa que tendrá efecto solamente hasta el desembolso final de fondos para la sesión celebrada en el país correspondiente. En el caso de que se efectúe la incorporación, se harán los nombramientos adicionales de conformidad con los requisitos legales.

PAISES CONSTITUYENTES.

7. Los que á continuación se expresan, serán considerados como países constituyentes del Congreso Médico Pan-Americano:

República Argentina, Bolivia, Brasil, América Inglesa del Norte, Chile, República Dominicana, Honduras, Méjico, Nicaragua, Paraguay, Perú, Salvador, Colombia, Costa Rica, Ecuador, Guatemala, Haití, Reino de Hawaii, Estados Unidos, Uruguay, Venezuela, Antillas Españolas, Inglesas, Frances, Danesas y Hollandesas.

SECCIONES.

8. Las secciones del Congreso serán las siguientes:

(1) Medicina, (2) Cirugia en general, (3) Medicina y Cirugía militares, (4) Obstetricia, (5) Ginecología y Cirugía abdominal, (6) Terapéutica, (7) Anatomia, (8) Fisiología, (9) Enfermedades de la Infancia, (10) Patología, (11) Oftalmología, (12) Laringología y Rinología, (13) Otología, (14) Dermatología y Sifilografía, (15)

(15) General Hygiene and Demography, (16) Marine Hygiene and Quarantine, (17) Orthopædic Surgery, (18) Diseases of the Mind and Nervous System, (19) Oral and Dental Surgery, (20) Medical Pedagogics, (21) Medical Jurisprudence, (22) Railway Surgery.

LANGUAGES.

9. The languages of the congress shall be Spanish, French, Portuguese, and English.

AUXILIARY COMMITTEES.

10. The auxiliary committee shall consist of one member for each medical society or one for each considerable center of population in each of the constituent countries of the congress. Nominations for the foreign auxiliary committee shall be made to the chairman of the committee on organization by the members of the international executive committee, each for his own country, except that in the country in which the congress is to be held nominations shall be made by the committee on organization. Appointments on the auxiliary committee shall hold only for the meeting for which they were made.

Members of the auxiliary committee shall be the official representatives of the congress in their respective localities. It shall be their duty—

(1) To transmit to the profession of their respective districts all information relative to the congress forwarded to them for that purpose by the general officers

(2) To co-operate with the officers of sections in securing desirable contributions to the proceedings of the congress.

(3) To furnish to the general officers such information as they may request for the purpose of promoting the interests of the congress.

(4) To cause such publicity to be given to the development of the organization as will elicit the interest of the profession and secure attendance upon the meeting; and they shall discharge such other duties as will promote the welfare of the congress.

AMENDMENTS.

11. Amendments to these regulations can be made only by the international executive committee, on a majority vote, ten members constituting a quorum, at any meeting of the congress.

SPECIAL REGULATIONS OF THE FIRST CONGRESS.

TIME AND PLACE OF MEETING.

1. The first Pan-American Medical Congress shall be held in the city of Washington, D. C., September 5, 6, 7, 8, A. D. 1893.

REGISTRATION.

2. The registration fee shall be $10 for each member residing in the United States, but no fee shall be charged to foreign members. Each registered member shall receive a card of membership and be furnished a set of the transactions.

ABSTRACTS, PAPERS, AND DISCUSSIONS.

3. Contributors are required to forward abstracts of their papers, not to exceed 600 words each, to be in the hands of the secretary-general not later than the 10th of July, 1893. These abstracts shall be translated into English, French, Spanish, and Portuguese, and shall be published in advance of the meeting for the convenience of the congress, and no paper shall be placed upon the programme which has not been thus presented by abstract. Abstracts will be translated by the literary

Higiene en general y Demografía, (16) Higiene marítima y Cuarentena, (17) Cirugía ortopédica, (18) Enfermedades mentales y del sistema nervioso, (19) Cirugía oral y dental, (20) Pedagogía médica, (21) Jurisprudencia médica, (22) Cirugía de Ferrocarriles.

IDIOMAS.

9. Los idiomas del Congreso serán el español, el francés, el portugués y el inglés.

COMISIONES AUXILIARES.

10. Las Comisiones Auxiliares se compondrán de un vocal por cada sociedad médica ó por cada centro considerable de población en cada uno de los países constituyentes del Congreso. Los nombramientos para la Comisión Auxiliar Extranjera serán presentados al presidente de la Comisión de Organización por la Comisión Ejecutiva Internacional, cada uno para su propio país; pero en el país en que se reuna el Congreso, los nombramientos estarán á cargo de la Comisión de Organización. Los nombramientos para la Comisión Auxiliar servirán solamente para la junta para la cual han sido hechos.

Los miembros de la Comisión Auxiliar serán representantes oficiales del Congreso en sus localidades respectivas. Será de su incumbencia:

(1) Trasmitir á los facultativos de sus distritos toda noticia relativa al Congreso que con este objeto le haya sido comunicada por la Dirección General.

(2) Cooperar con la mesa de las secciones á suministrar los trabajos que se desean para presentar al Congreso.

(3) Tener á la Dirección General al corriente de todo lo que se les pida con el objeto de llevar á cabo las intenciones del Congreso.

(4) Dar la debida publicidad al desarrollo de la organización para despertar el interés de la facultad, promoviendo la asistencia á las sesiones, y atender á todo lo que asegure el buen éxito del Congreso.

REFORMAS.

11. No se podrán hacer reformas en este reglamento sino por la Comisión Ejecutiva Internacional y por mayoría de votos, entendiéndose que diez miembros constituyen junta para cualquier sesión del Congreso.

REGLAMENTO ESPECIAL PARA EL PRIMER CONGRESO.

ÉPOCA Y LUGAR DE LA JUNTA.

1. El primer Congreso Médico Pan-Americano se efectuará en la ciudad de Washington, capital de los Estados Unidos, en los días 5, 6, 7 y 8 de setiembre de 1893.

ASIENTOS.

2. Al asentar sus nombres los asociados residentes en los Estados Unidos pagarán 10 pesos; pero á los extranjeros no se cobrará ninguna cuota. Cada miembro, después del asiento, recibirá una tarjeta que le acredite, y la colección de actas.

EXTRACTOS, ESCRITOS Y DISCUSIONES.

3. Los Señores que presenten trabajos, habrán de dar un extracto de sus escritos, que no exceda de seiscientas palabras para cada uno, poniéndolo en manos del Secretario General antes del 10 de julio de 1893. Estos extractos serán traducidos en inglés, francés, español y portugués, y se publicarán antes de la junta para conveniencia del Congreso; entendiéndose que ningún escrito tendrá lugar en el programa que no haya sido antes presentado en extracto. Los extractos serán traducidos por

bureau of the congress at the request of contributors. Papers to be presented to sections must not consume more than twenty minutes each in reading and when of greater length must be read by abstract. Papers read by abstract may be printed in full in the transactions, subject to approval by the editorial committee. Abstracts should be forwarded through the secretaries of sections. Papers and discussions will be printed in the language in which they may be presented. All papers read in the sections shall be surrendered to the secretaries of the sections; all addresses read in the general session shall be surrendered to the secretary-general as soon as read; and all discussions shall be at once reduced to writing by the participants.

INCORPORATION.

4. The chairman of the committee on organization shall cause the congress to be incorporated under the laws of Ohio, and fifteen trustees shall be elected in accordance therewith, who, by by-laws and through the executive committee, shall supervise all receipts and disbursements by the treasurer, in accordance with the laws of Ohio. The president, secretary-general, treasurer, the member of the international executive committee for the United States, and executive presidents of sections shall be *ex officio* members of the board of trustees.

FOREIGN NOMINATIONS.

5. All nominations by the international executive committee must be in the hands of the chairman of the committee on organization by June 1, 1892, and in default thereof the committee on organization shall elect officers for countries thus delinquent.

THE ORGANIZATION OF SECTIONS.

6. The officers of each section shall consist of —— honorary presidents, who shall be residents of the constituent countries of the congress; one executive president, who shall organize the work of the section, direct its deliberations, and deliver an inaugural address at its opening session; one English-speaking secretary and one Spanish-speaking secretary, residents of the United States, who shall cooperate with the executive president in conducting the correspondence of the section; and there shall be one secretary for each section, resident in each additional constituent country of the congress.

DOMESTIC AUXILIARY COMMITTEE.

7. The auxiliary committee for the United States shall be elected by the committee on organization and shall consist of one member for each local medical society, or, in the absence of medical organization, then one in each considerable center of population, which auxiliary committee shall cooperate with the committee on organization and with the general officers in promoting the welfare of the congress. Nominations for the auxiliary committee shall be made by members of the committee on organization, each for his own State, except that in the failure of any member to make such nomination by January 1, 1892, or in the inadequacy of the same, the chairman of the committee on organization shall supply the deficiency.

EXECUTIVE COMMITTEE.

8. The board of trustees shall designate seven members, including the president, treasurer, secretary-general, and member of the international executive committee for the United States, who shall comprise an executive committee, which shall transact all business of the congress, *ad interim*, in accordance with by-laws adopted by the board of trustees.

el Departamento Literario del Congreso á petición de sus autores. Los escritos que se presenten á las secciones no han de tomar, en su lectura, más de 20 minutos cada uno; y si no fueren de esta extensión, habrán de leerse en extracto. Los escritos leídos en extracto aparecerán impresos íntegramente en las actas, mediante la aprobacion de la Mesa Editorial. Los extractos se dirigirán á los Secretarios de Secciones. Los escritos y las discusiones se imprimirán en el idioma correspondiente. Todo escrito leído en las secciones será entregado á los Secretarios de Sección: y todo discurso leído en Sesión General lo será al Secretario General inmediatamente después de la lectura. Toda discusión se pondrá desde luego por escrito por los que hayan tomado parte en ella.

INCORPORACIÓN.

4. El Presidente de la Comisión de Organización cuidará de que el Congreso reciba existencia legal según las leyes del Estado de Ohio, y de conformidad con ellas, se elegirán quince curadores, los cuales, por un reglamento especial y con la intervención de la Comisión Ejecutiva, inspeccionará todas las entradas y salidas de fondos hechas por el Tesorero, de acuerdo con las leyes del Estado de Ohio. El Presidente, el Secretario General, el Tesorero, el Representante de los Estados Unidos en la Comisión Ejecutiva Internacional y los Presidentes Ejecutivos de las Secciones, serán vocales de oficio del Cuerpo de Curadores.

NOMBRAMIENTOS EXTRANJEROS.

5. Todo nombramiento para la Comisión Ejecutiva Internacional deberá estar en poder del Presidente de la Comisión de Organización antes del primero de junio de 1892; y si faltare alguno, la Comisión de Organización procederá á elegir la mesa correspondiente.

ORGANIZACIÓN DE LAS SECCIONES.

6. La mesa de cada sección se compondrá de presidentes honorarios, los cuales han de ser residentes de los paises constituyentes del Congreso; de un Presidente Ejecutivo que organizará los trabajos de la sección, dirigirá sus deliberaciones y pronunciará un discurso inaugural en la apertura de la sesión; de un Secretario que hable el inglés y otro que hable en español, residentes ambos en los Estados Unidos, los cuales auxiliarán al Presidente Ejecutivo en el despacho de la correspondencia de la sección; y habrá un Secretario para cada sección, residente en cada país constituyente adicional del Congreso.

COMISIÓN AUXILIAR DE LOS ESTADOS UNIDOS.

7. La Comisión Auxiliar de los Estados Unidos será elegida por la Comisión de Organización, y se compondrá de un vocal por cada sociedad médica local, ó, á falta de organización médica, de un facultativo por cada centro considerable de población; la cual Comisión auxiliar cooperará con la Comisión de Organización y con la Dirección General á promover el buen éxito del Congreso. Las designaciones para la Comisión Auxiliar serán hechas por vocales de la Comisión de Organización, cada uno por su propio Estado; pero en el caso de que dichos vocales no hicieren la designación antes del primero de enero de 1892, ó que ésta fuere inadecuada, llenará el vacío el Presidente de la Comisión Organizadora.

COMISIÓN EJECUTIVA

8. El Cuerpo de Curadores designará siete miembros incluyéndo el Presidente, el Tesorero, el Secretario General y el Vocal Representante de los Estados Unidos en la Comisión Ejecutiva Internacional, los cuales constituirán una Comisión Ejecutiva que interinamente y de acuerdo con los Reglamentos que adopte dicho cuerpo entenderá en todo lo relativo á los asuntos del Congreso.

GENERAL OFFICERS OF THE CONGRESS.

President.

WILLIAM PEPPER, M. D., LL. D., Philadelphia, Pa.

Vice-presidents.

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Dr. JEROME COCHRAN, Montgomery, Ala.
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Dr. P. O. HOOPER, Little Rock, Ark.
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Dr. O. O. BURGESS, San Francisco, Cal.
Dr. J. E. GRAHAM, Toronto, Canada.
Dr. MANUEL BARROS BORGOÑO, Santiago, Chile.
Dr. PIO RENGIFO, New York, (for) Colombia.
Dr. CHARLES DENISON, Denver, Colo.
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Dr. EDMUND ANDREWS, Chicago, Ill.
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Dr. MANUEL CARMONA Y VALLE, City of Mexico, Mexico.
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Dr. J. J. SENIOR, Curaçao, West Indies.
Dr. S. L. ÇRANE, Surg. Gen., Trinidad, West Indies.
Dr. THOS. BOWEN, Bridgetown (Barbados), West Indies.
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Dr. C. SHRIVER, Bethany, W. Va.
Dr. SOLON PARKS, Milwaukee, Wis.
Dr. JOHN H. FINFROCK, Laramie City, Wyo.
Dr. B. J. D. IRWIN, Assistant Surgeon-General, Washington, D. C., U. S. Army.
Dr. J. MILLS BROWNE, Surgeon-General, Washington, D. C., U. S. Navy.
Surg. CHAS. S. D. FESSENDEN, Louisville, Ky., U. S. Marine-Hospital Service,

Secretary-General.

CHARLES A. L. REED, M. D., 311 Elm street, Cincinnati, Ohio.

Assistant Secretaries-General.

1. Dr. J. MCFADDEN GASTIN, 1½ Edgewood avenue, Atlanta, Ga.
2. Dr. JOHN GUITÉRAS, 3914 Sansom street, Philadelphia, Pa.
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4. Dr. W. H. HEATH, 415 Pearl street, Buffalo, N. Y.
5. Dr. IRVING A. WATSON, 10 Centre street, Concord, N. H.
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7. Dr. FERD. C. VALENTINE, 236 W. Fifty-first street, New York, N. Y.
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Dr. J. C. CULBERTSON, Chicago, Ill.

The president, secretary-general, treasurer, members of the international executive committee for the United States, and executive presidents of sections are *ex officio* members of the board of trustees.

Executive committee.

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Dr. L. S. MCMURTRY, 231 W. Chestnut street, Louisville, Ky.
Dr. WM. WARREN POTTER, 284 Franklin street, Buffalo, N. Y.
Dr. WILLIAM PEPPER, (*ex officio*), 1811 Spruce street, Philadelphia, Pa.
Dr. A. M. OWEN, (*ex officio*), 507 Upper First street, Evansville, Ind.
Dr. A. VANDER VEER, (*ex officio*), 28 Eagle street, Albany, N. Y.
Dr. CHARLES A. L. REED, (*ex officio*), 311 Elm street, Cincinnati, Ohio.

International executive committee.

Argentine Republic.—Dr. PEDRO LAGLEYZE, Calle Artes 46, Buenos Ayres.
Bolivia.—Dr. EMILIO DI TOMASSI, Calle Ayacucho 26, La Paz.
British West Indies.—Dr. JAMES A. DE WOLF, Port of Spain.
British North America.—Dr. JAMES F. W. ROSS, 481 Sherborne street, Toronto.
Chile.—Dr. MOISES AMARAL, Facultad de Medicina, Santiago.

Costa Rica.—Dr. DANIEL NUÑEZ, San José.
Dominican Republic.—Dr. JULIO LEON, Santo Domingo.
Ecuador.—Dr. RICARDO CUCALON, Guayaquil.
French West Indies.—Dr. J. J. CORNILLIAC, St. Pierre, Martinique.
Guatemala.—Dr. JOSÉ MONTEROS, Avenida Sur No. 8, Guatemala City.
Haiti.—Dr. T. LAMOTHE, Rue du Centre, Port au Prince.
Hawaii.—Dr. JOHN S. MCGREW, Honolulu.
Honduras (Spanish.—Dr. GEO. BERNHARDT, Tegucigalpa.
Mexico.—Dr. TOMÁS NORIEGA, Hospital de Jesus, Mexico.
Nicaragua.—Dr. J. I. URTECHO, Calle Real, Granada.
Paraguay.—No nomination received.
Peru.—Dr. MANUEL C. BARRIOS, Facultad de Medicina, Lima.
Republic of Colombia.—Dr. P. M. IBAÑEZ, Calle 5a Número 99, Bogota.
Salvador.—Dr. DAVID J. GUZMAN, San Salvador.
Spanish West Indies.—Dr. JUAN SANTOS FERNANDEZ, Calle Reina No. 92, Havana.
United States of America.—Dr. A. VANDER VEER, 28 Eagle street, Albany, N. Y.
United States of Brazil.—Dr. CARLOS COSTA, Rua Largo da Misericordia 7, Rio de Janeiro.
Uruguay.—Dr. JACINTO DE LEON, Calle de Florida No. 64, Montevideo.
Venezuela.—Dr. ELIAS RODRIGUEZ, Caracas.

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G. L. MAGRUDER, M. D., *treasurer.*

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Subcommittees.

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Alaska.—Dr. Clarence Thwing, Sitka.

Argentine Republic.—Dr. Pedro Lagleyze, Buenos Aires, member International Executive Committee; Dr. Samuel Gache, Lavalle 725, Buenos Aires, Circulo Médico Argentino; Dr. Francisco Lavalle, Victoria 1104, Buenos Aires, Sociedad Nacional de Farmacia; Dr. Emilio R. Coni, Tacuari 252, Buenos Aires, Sociedad Médica Argentina; Dr. Ignacio Bas Ossa, La Plata, Centro Médico de la Plata; Dr. Arturo Ferrand, Cordoba, Centro Médico de Cordoba.

For local profession: Dr. J. Martin, Buenos Aires; Dr. Vidal Peña, Cordoba; Dr. Format. Rosario; Dr. Arce Peñalvo, La Plata; Dr. Cossio, Tucuman; Dr. Alverez, Mendoza; Dr. Arias, Salta; Dr. Tezanos Pinto, Parana; Dr. Graciano, Corrientes; Dr. E. Videla, Santa Fé; Dr. Matorras, Gualeguaychu; Dr. R. Sarmiento, San Juan; Dr. Corvalan, Santiago del Estero; Dr. Moras, Chivilcoy; Dr. Delgado, San Luis; Dr. Herrera, Catamarca; Dr. Luna, Rioga; Dr. Carillo, Jujuy; Dr. Amoretti, Territorios Nacionales.

Arizona.—Dr. Henry A. Hughes, Phœnix, member of National Committee on Organization.

For local profession: Dr. R. L. Rosson, Dr. Roberts, Dr. T. Adler, Dr. Wm. Hunt, Dr. J. Goodfellow, Dr. J. T. Holcomb, Dr. M. M. Gilbert.

Bolivia.—Dr. Emilio di Tomassi, La Paz, member of the International Executive Committee.

For the local profession: Dr. Manuel Cuellar (hijo) Sucre; Dr. Ricardo Guzman,

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New Jersey.—Dr. E. J. Marsh, Paterson, member of the national committee on organization. Dr. Boardman Reed, Atlantic County Medical Society; Dr. Daniel A. Currie, Bergen County Medical Society; Dr. F. Gaunt, Burlington County Medical Society; Dr. E. L. B. Godfrey, Camden County Medical Society; Dr. J. C. Marshall, Cape May County Medical Society; Dr. H. W. Elmer, Cumberland County Medical Society; Dr. Edward J. Ill, Essex County Medical Society; Dr. Howard Wilson, Gloucester County Medical Society; Dr. O. H. Sproul, Hunterdon; Dr. B. W. McGallard, Mercer County Medical Society; Dr. D. C. English, Middlesex County Medical Society; Dr. S. Pierson, Morris County Medical Society; Dr. P. A. Harris, Passaic County Medical Society; Dr. B. A. Waddington, Salem County Medical Society; Dr. H. G. Wagoner, Somerset County Medical Society; Dr. L. W. Miller, Sussex County Medical Society; Dr. A. Pettit, Union County Medical Society; Dr. J. C. Johnson, Warren County Medical Society; Dr. H. P. Houghton, Monmouth County Medical Society.

New York.—Dr. John Cronyn, Buffalo, member of the national committee on organization. Dr. Douglas Ayres, first district branch of the New York State Medical Association; Dr. E. D. Ferguson, second district branch of the New York State Medical Association; Dr. J. D. Tripp, third district branch of the New York State Medical Association; Dr. S. T. Clark, fourth district branch of the New York State Medical Association; Dr. E. H. Squibb, fifth district branch of the New York

State Medical Association; Dr. A. Walter Suiter, Medical Society of the State of New York; Dr. Albert Vander Veer, Albany County Medical Society; Dr. W. W. Crandall, Allegany County Medical Society; Dr. J. C. Comstock, Broome County Medical Society; Dr. I. Z. Fisher, Cattaraugus County Medical Society; Dr. C. P. Criveling, Cayuga County Medical Society; Dr. Edward Ames, Chautauqua County Medical Society; Dr. Henry Flood, Chemung County Medical Society; Dr. H. C. Lyman, Chenango County Medical Society; Dr. D. S. Kellogg, Clinton County Medical Society; Dr. E. C. Fritts, Columbia County Medical Society; Dr. F. W. Higgins, Cortland County Medical Society; Dr. S. S. Cartwright, Delaware County Medical Society; Dr. R. K. Lothill, Dutchess County Medical Society; Dr. W. W. Potter, Erie County Medical Society; Dr. Edward T. Strong, Essex County Medical Society; Dr. James Macfie, Franklin County Medical Society; Dr. Eugene Beach, Fulton County Medical Society; Dr. Charles E. Willar, Greene County Medical Society; Dr. C. W. Hamlin, Herkimer County Medical Society; Dr. James D. Spencer, Jefferson County Medical Society; Dr. Lewis S. Pilcher, Kings County Medical Society; Dr. W. H. Johnston, Lewis County Medical Society; Dr. F. M. Perrine, Livingston County Medical Society; Dr. H. W. Carpenter, Madison County Medical Society; Dr. John O. Roe, Monroe County Medical Society; Dr. Chas. Stover, Montgomery County Medical Society; Dr. Frederick R. Sturgis, New York County Medical Society; Dr. Alfred L. Loomis, Academy of Medicine; Dr. M. S. Kittinger, Niagara County Medical Society; Dr. James H. Glass, Oneida County Medical Society; Dr. J. L. Heffron, Onondaga County Medical Society; Dr. Burk Pillsbury, Orange County Medical Society; Dr. Wm. C. Bailey, Orleans County Medical Society; Dr. F. S. Low, Oswego County Medical Society; Dr. O. W. Peck, Otsego County Medical Society; Dr. George W. Murdock, Putnam County Medical Society; Dr. C. G. J. Finn, Queens County Medical Society; Dr. W. W. Seymour, Rensselaer County Medical Society; Dr. F. E. Martindale, Richmond County Medical Society; Dr. E. H. Maynard, Rockland County Medical Society; Dr. B. F. Sherman, St. Lawrence County Medical Society; Dr. Wm. L. Pearson, Schenectady County Medical Society; Dr. Lemuel, Cross Schoharie County Medical Society; Dr. S. B. Allen, Schuyler County Medical Society; Dr. H. R. Ainsworth, Steuben County Medical Society; Dr. B. D. Skinner, Suffolk County Medical Society; Dr. W. W. Appley, Sullivan County Medical Society; Dr. C. L. Stiles, Tioga County Medical Society; Dr. S. H. Peck, Tompkins County Medical Society; Dr. Thomas S. Dawes, Ulster County Medical Society; Dr. B. G. Streeter, Warren County Medical Society; Dr. Henry Root, Washington County Medical Society; Dr. J. N. Arnold, Wayne County Medical Society; Dr. E. F. Brush, West Chester County Medical Society; Dr. Benj. L. Holt, Yates County Medical Society; Dr. R. J. Wilding, Medical Association of Northern New York; Dr. J. W. Whitbeck, Rochester Pathological Society; Dr. W. M. Gobson, Utica Medical Library Association.

Nicaragua.—Dr. Juan Ignacio Urtecho, Calle Real, city of Granada, member of the international executive committee. Dr. Fran'co M. Lacayo, León, Protomedicato de la República. For the local profession: Dr. Basilio Marín, Leon; Dr. Carmen Bengochea, Managua; Dr. Alejandro Bolaños, Masaya; Dr. E. Flint, Rivas.

North Carolina.—Dr. H. Longstreet Taylor, Asheville, member national committee on organization. Dr. Karl von Ruck, Buncombe County Medical Society; Dr. J. W. Long, Randolph County Medical Society; Dr. J. M. Hays, Granville County Medical Society. For local profession: Dr. J. B. Watts, Taylorsville; Dr. N. Robinson, Elizabethtown; Dr. R. S. Young, Concord; Dr. A. A. Kent, Lenoir; Dr. M. F. Arendell, Dr. R. H. Williamson, Yanceyville; Dr. J. M. McCorkle, Newton; Dr. H. T. Chapin, Pittsboro; Dr. J. F. Abernathy, Murphy; Dr. R. H. Winborne, Barnitz; Dr. O. P. Gardner, Shelby; Dr. J. A. Hodges, Fayetteville; Dr. R. L. Payne, jr., Lexington; Dr. J. W. Blount, Kenansville; Dr. N. M. Johnson, Durham; Dr. E. S. Foster, Louisburg; Dr. E. B. Holland, Dallas; Dr. E. H. Sugg, Snow Hill; Dr. E. R. Michaux, Greensboro; Dr. A. B. Pierce, Weldon; Dr. R. L. Allen, Waynes-

ville; Dr. W. B. Reese, Hendersonville; Dr. M. W. Hill, Statesville; Dr. J. M. Chandler, Dillsboro; Dr. W. L. Crouse, Lincolnton; Dr. J. M. Lyle, Franklin; Dr. J. H. Gilkey, Marion; Dr. F. W. Potter, Wilmington; Dr. Jno. Whitehead, Salisbury; Dr. James McKee, Raleigh; Dr. W. H. H. Cobb, Goldsboro; Dr. Joseph Gracham, Charlotte; Dr. Albert Anderson, Wilson; Dr. Charles McDuffie, Newbern; Dr. P. H. Murphy, Morganton.

Ohio.—Dr. Chas. A. L. Reed, Cincinnati, member national committee on organization. Dr. T. V. Fitzpatrick, Cincinnati Academy of Medicine; Dr. L. S. Colter, Cincinnati Medical Society; Dr. S. B. Hiner, Allen County Medical Society; Dr. Jno. A. Dickson, Ashtabula County Medical Society; Dr. A. J. Gawne, Bay City Medical Society; Dr. J. S. McClellan, Belmont County Medical Society; Dr. W. W. Ellsbury, Brown County Medical Society; Dr. J. F. Baldwin, Central Ohio Medical Society; Dr. C. E. Imhoff, Champaign; Dr. Seys, Clark County Medical Society; Dr. A. W. Ashburn, Clermont County Medical Society; Dr. W. H. Humiston, Cuyahoga County Medical Society; Dr. G. W. Hoglan, Columbus Medical Club; Dr. L. G. Thacker, Defiance County Medical Society; Dr. J. B. Ford, Delamater Medical Association; Dr. O. Pomeroy, Geauga County Medical Society; Dr. Alta F. Cook, Erie County Medical Society; Dr. F. D. Bain, Hardin County Medical Society; Dr. D. J. Snider, Harrison County Medical Society; Dr. D. B. Cotton, Hempstead Memorial Academy of Medicine; Dr. A. M. Brown, Highland County Medical Society; Dr. J. G. Bigham, Holmes County Medical Society; Dr. A. A. Elliott, Jefferson County Medical Society; Dr. Chas. F. House, Lake County Medical Society; Dr. S. S. Scoville, Lebanon Medical Society; Dr. Jos. Larimore, Licking County Medical Society; Dr. J. McCurdy, Mahoning County Medical Society; Dr. F. W. Thomas, Marion County Medical Society; Dr. J. H. Hysell, Meigs County Medical Society; Dr. T. M. Wright, Miami County Medical Society; Dr. J. W. Grimes, Monroe County Medical Society; Dr. F. H. Darby, Miami Valley Medical Society; Dr. Geo. Goodhue, Montgomery County Medical Society; Dr. H. S. Green, Morrow County Medical Society; Dr. R. Harvey Reed, North Central Ohio Medical Association; Dr. E. C. Brush, Hildreth District Medical Association; Dr. W. C. Jacobs, Northeast Ohio Medical Association; Dr. D. W. Steiner, Northwest Ohio Medical Association; Dr. T. B. Wright, Pickaway County Medical Society; Dr. J. E. Shellenberger, Piqua Society of Clinical Medicine; Dr. J. B. Welsh, Preble County Medical Society; Dr. E. J. Galbraith, Ross County Medical Society; Dr. D. P. Campbell, Sandusky County Medical Society; Dr. T. J. West, Seneca County Medical Society; Dr. D. R. Silver, Shelby County Medical Society; Dr. David P. Maxwell, Stark County Medical Society; Dr. R. J. Pumphrey, Stillwater Medical Society; Dr. L. S. Ebright, Summitt County Medical Society; Dr. S. S. Thorn, Toledo Medical Association; Dr. C. S. Ward, Trumbull County Medical Society; Dr. A. L. King, Union Medical Society; Dr. Samuel Hart, Washington County Medical Society; Dr. J. E. Barrett, Wayne County Medical Society; Dr. W. M. Fuller, Wood County Medical Society; Dr. H. T. Sutton, Zanesville Medical Society: Dr. Dan Millikin, Butler County Medical Society; Dr. J. G. Reed, Union District Medical Society; Dr. Wm. E. Rice, Darke County Medical Society; Dr. R. B. Hall, Southwestern Ohio Medical Society.

Oregon.—Dr. William Boys, Portland, member of the National Committee on Organization. For local profession: Dr. H. F. McCormick, Eugene; Dr. J. M. Pruett, Pendleton; Dr. W. E. Rinehart, The Dalles; Dr. F. M. Robinson, Beaverton; Dr. H. B. Stanley, Dallas; Dr. O. J. West, Wasco; Dr. O. M. Dodson, Baker City; Dr. G. R. Farra, Corvallis; Dr. J. A. Fulton, Astorio; Dr. C. S. Hall, Salem; Dr. J. L. Hill, Albany; Dr. M. F. Honan, La Grande; Dr. J. M. V. Chalmers, Hillsboro; Dr. H. A. Wright, Linkville.

Pennsylvania.—Dr. William Pepper, Philadelphia, member National Committee on Organization; Dr. A. W. Thomas, Adams County Medical Society; Dr. W. H. Mercur, Alleghany County Medical Society; Dr. T. M. Allison, Armstrong County Medical Society; Dr. W. H. Grim, Beaver County Medical Society; Dr. John A. Clark,

Bedford County Medical Society; Dr. W. M. Weidman, Berks County Medical Society; Dr. William M. Findlay, Blair County Medical Society; Dr. C. K. Ladd, Bradford County Medical Society; Dr. R. B. Knight, Bucks County Medical Society; Dr. Samuel Graham, Butler County Medical Society; Dr. L. H. Mayer, Cambria County Medical Society; Dr. Joseph A. Horne, Carbon County Medical Society; Dr. C. S. Musser, Center County Medical Society; Dr. Jacob Price, Chester County Medical Society; Dr. J. F. Ross, Clarion County Medical Society; Dr. J. E. Vaughn, Clearfield County Medical Society; Dr. J. R. Montgomery, Columbia County Medical Society; Dr. George W. Barr, Crawford County Medical Society; Dr. R. L. Sibbett, Cumberland County Medical Society; Dr. Hugh Hamilton, Dauphin County Medical Society; Dr. J. L. Forwood, Delaware County Medical Society; Dr. C. G. Wilson, St. Marys, Elk County Medical Society; Dr. L. S. Gaddis, Fayette County Medical Society; Dr. G. S. Hull, Franklin County Medical Society; Dr. I. H. Sharpnack, Greene County Medical Society; Dr. A. B. Brumbaugh, Huntington County Medical Society; Dr. William Anderson, Indiana County Medical Society; Dr. W. K. Dolan, Lackawanna County Medical Society; Dr. G. R. Rohrer, Lancaster County Medical Society; Dr. A. B. Gloninger, Lebanon County Medical Society; Dr. W. S. Berlin, Lehigh County Medical Society; Dr. L. H. Taylor, Luzerne County Medical Society; Dr. C. W. Youngman, Lycoming County Medical Society; Dr. E. O. Kane, McLean County Medical Society; Dr. J. W. Hillier, Mercer County Medical Society; Dr. S. H. Rothrack, Miffin County Medical Society; Dr. Joseph Anderson, Montgomery County Medical Society; Dr. P. C. Newbaker, Montour County Medical Society; Dr. Isaac Ott, Northampton County Medical Society; Dr. W. G. Marsh, Northumberland County Medical Society; Dr. H. O. Orris, Perry County Medical Society; Dr. J. S. Carpenter, Schuylkill County Medical Society; Dr. P. A. Boyer, Snyder County Medical Society; Dr. W. L. Richardson, Susquehanna County Medical Society; Dr. J. A. Ritchey, Venango County Medical Society; Dr. W. M. Baker, Warren County Medical Society; Dr. J. A. McKean, Washington County Medical Society; Dr. R. B. Hammer, Westmoreland County Medical Society; Dr. I. C. Gable, York County Medical Society.

Republic of Columbia.—Dr. Pedro M. Ibañez, Calle 5, número 99, Bogotá, member of the International Executive Committee; Dr. José M. Buendia, calle 10, Bogotá, Academia nacional de Medicina; Dr. Manuel Uribe Angel, Medellín, Academia de Medicina de Medellín; Dr. Evaristo García, Cali, Sociedad de Medicina del Cauca. For the local profession: Dr. Nicolás Osorio, calle 13, Bogota; Dr. Andrés Posada Arango, Medellín (Departamento de Antioquia); Dr. Jorge E. Delgado, Panamá (Departamento de Panamá); Dr. Eugenio de la Hoz, Barranquilla (Departamento de Bolívar); Dr. Domingo Cagiao, Popayán (Departamento del Cauca); Dr. José Manuel Rodriquez, Socorro (Departamento de Santander); Dr. Paulo Emilio Villar, Bucaramanga (Departamento de Santander); Dr. Felix M. Hernandez, Cúcuta (Departamento de Santander); Dr. Rafael Calvo, Cartagena (Departamento de Bolívar); Dr. N. Ribón; Mompox (Departamento de Bolivar); Dr. Miciades Castro, Ibagué (Departamento del Tolima); Dr. Cayetano Lombana, Ambalema (Departamento del Tolima); Dr. José M. Martinez, Antioquia (Departamento de Antioquia); Dr. Isaias Saavedra, Velez (Departamento de Santander); Dr. Severs Forres, Funja (Departamento de Boyacá); Dr. N. Villa, Remedios (Departamento de Antioquia); Dr. Miguel Caicedo, Pasto (Departamento de Cauca); Dr. Emilio Villamazar, Pamplona (Departamento de Santander.)

Republic of Guatemala.—Dr. Jose Monteros, Calle Avenida Sur No. 8, City of Guatemala, member of the International Executive Committee; Dr. Samuel Gonzales, City of Guatemala, Facultad de Medicina y Farmacia del Centro; Dr. Leon Saenz, Quezaltenango, Facultad de Medicina y Farmacia de Occidente; Dr. Manuel Aparicio, Quezaltenango, Sociedad Médica, Farmacéutico de Occidente. For the local profession: Dr. Enecon Mora, Quezaltenango.

Rhode Island.—Dr. George L. Collins, Providence, member National Committee on

Organization; Dr. John W. Mitchell, Providence Medical Association; Dr. F. H Rankin, Newport Medical Society; Dr. Henry K. Gardiner, Washington Medical Society; Dr. W. F. Hutchinson, Providence.

South Carolina.—Dr. R. A. Kinloch, Charleston, member National Committee on Organization; Dr. L. T. Hill, Abbeville; Dr. T. G. Croft, Aiken; Dr. S. M. Orr, Anderson; Dr. W. F. Holmes, Barnwell; Dr. A. P. Prioleau, Beaufort; Dr. J. P. Cain, Monk's Corner; Dr. S. M. Davage, Chester; Dr. C. Kollock, Cheraw; Dr. W. S. Pack, Manning; Dr. Charles Witsell, Walterboro; Dr. J. C. Wilcox, Darlington; Dr. Thomas J. McKie, Woodlawn; Dr. J. C. Buchanan, Winnsboro; Dr. James Evans, Florence; Dr. Thomas P. Bailey, Georgetown; Dr. J. M. Wilkinson, Greenville; Dr. S. Smith, Brighton; Dr. W. E. Sparkman, Bucksville; Dr. A. A. Moore, Camden; Dr. W. O. Nesbit, Lancaster; Dr. J. T. Poole, Laurens; Dr. M. Q. Hendrix, Lexington; Dr. J. C. Mullins, Marion; Dr. J. L. Napier, Blenheim; Dr. O. B. Mayer, jr., Newberry; Dr. J. James, Westminster; Dr. C. R. Tabor, Fort Mott; Dr. J. W. Quillian, Easley; Dr. B. W. Taylor, Columbia; Dr. T. S. Means, Spartanburg; Dr. A. J. China, Sumter; Dr. M. W. Culp, Union; Dr. S. D. M. Byrd, Scranton; Dr. R. A. Bratton, Yorkville.

Spanish West Indies.—Dr. Juan Santos Fernandez, Reina No. 92, Havana, Cuba, member of the International Executive Committee; Dr. Federico Hortsman, Havana Real Academia de Ciencias Médicas; Dr. Diego Tamayo, Havana, Sociedad de Estudios, Clínicos; Dr. Aristides Mestre, Havana, Sociedad Antropológica; ———, Sociedad de Hygiene. For the local profession: Cuba—Dr. Joaquin Diago, Havana; Dr. José H. Perez, Baracoa; Dr. Fernandez Mendez Capote, Cardenas; Dr. Gabriel M. Landa, Cienfuegos; Dr. Angel Cantero, Trinidad; Dr. Sebastian Cuerro y Serrano Zaza; Dr. Vicente Tomás, Matanzas; Dr. Francisco Martinez Mesa, Sagua la Grande; Dr. Amado del Valle, Gibara; Dr. Manuel G. Gonzalez, Nuevitas; Dr. Domingo Lagomasino, San Juan de los Remedios; Dr. Urbano Guimera, Santiago de Cuba; Dr. Fernando Pons, Guantánamo; Dr. Francisco Codina, Manzanillo; Dr. Luis D. Pimienta, Santa Cruz de los Pinos; Dr. Francisco Solano Ramos, Pinar del Rio; Dr. Juan Guzmán, Puerto Principe; Dr. Rudesindo G. Rizo, Sancti Spiritus; Dr. Toribio del Villar, Güines; Dr. Rafael Trista, Villa Clara; Dr. Leonardo Esperón, Colón; Dr. Francisco Portela, Guanajay; Dr. Enrique V. Valenzuela, Guanabacoa; Dr. Enrique Ranz, Sante Fé de Isla de Pinos. Puerto Rico: Dr. Salvador Carbonell, Mayagüez; Dr. Juan Fernandez, San Juan; Dr. J. Ruiz, Aguadilla; Dr. Rafael Valle, Arecibo; Dr. J. López, Fajardo; Dr. Blondet, Guayama; Dr. C. Camó, Naguabo; Dr. Vasquez, Viequez; Dr. Eduardo Lacot, Ponce.

United States of Brazil.—Dr. Carlos Costa, Calle Largo de Misericordia 7, Rio de Janeiro; Dr. Visconde de Saboia, Rio de Janeiro, Academia Nacional de Medicina; Dr. Oscar Bulhões, Rio de Janeiro, Sociedade de Medicina e Cirurgia do Rio de Janeiro; Dr. Carlos Hastings, Rio de Janeiro, Instituto dos Cirurgiões Dentistas Brasilieros; Dr. Moura Brazil, Rio de Janeiro, Polyclinica Geral; Dr. Silva Lima, Bahia, Sociedade Medica de Bahia; Dr. João Penido, Juiz de Fora, Sociedade de Medicina e Cirurgia de Juiz de Fora; Dr. Luiz Pedro de Barbosa, Rio de Janeiro, Gremio dos internas dos Hospitaes do Rio de Janeiro. For the local profession: Dr. A. Ferreira da Silva and Dr. Paulo Cezar, Rio de Janeiro; Dr. Nina Rodriques and Dr. Pacifico Pereira, Bahia; Dr. Malaquias Goncalves and Dr. Alcebiades Vellozo, Pernambuco; Dr. Miranda Azevedo and Dr. Mello e Oliviera, São Paulo; Dr. O. de Almeida and Dr. Joao Godinho—Balfort Rôxo, Para; Dr. Eduardo Guimarães, Campinas; Dr. Almir Nino, Maranhão; Dr. Victor de Britto, Porto Alegre; Dr. Luna Friere and Dr. Matos de Alencar, Ceara; Dr. Eduardo de Menezes and Dr. Simões Correa, Juiz de Fora; Dr. Goulart, Esperito Santo; Dr. Duarte Schutel, Santa Catharina; Dr. Ismael de Rocha, Curitiba.

Uruguay.—Dr. Jacinto de Leon, calle de Florida núm. 61, Montevideo, member of the international executive committee; Dr. Juan L. Heguy, 18 de Julio 51, Montevideo, Honorable Consejo de Higiene; Dr. José Romeu, Plaza de Cagancha 41, Monte-

video, Círculo Médico Uruguayo. For the local profession: Dr. Atilio Chiassaro, Salto; Dr. Julio Jurkoski, Artigas; Dr. N. Parietti, Paysandu; Dr. Pascual Cioni, Fray Bentos; Dr. Jerónimo Rodriguez Gallego, Mercedes; Dr. Guillermo Dall' Orto, Colonia; Dr. Alejandro Chiolini, San José; Dr. N. Laborde, Flores; Dr. José Scozeria, Montevideo; Dr. N. Caleza, San Carlos; Dr. Alfonso Cifani, Rocha; Dr. N. Murguia, Melo; Dr. Juan Resso Herrera, Montevideo (por Treinta y Tres); Dr. Hermenegilda Gagliardi, Minas; Dr. Antonio Bonasso, San Fructuoso; Dr. Eduardo Lamas, Salto; Dr. Ramón Irigoyen, Florida; Dr. Julián B. Blanco, Durazno; Dr. Pedro de Freitas, Canelones.

Utah.—Dr. F. S. Bascom, Salt Lake City, member national committee on organization; Dr. A. C. Standart, Salt Lake Medical Society; Dr. J. P. Carnahan, Ogden Medical Society.

Venezuela.—Dr. José María Rodríguez Garmendia, Tocuyo; Dr. Francisco A. Risquez, Caracas; Dr. Freites Pineda, Ciudad Bolivar; Dr. Domingo Bello Hernández, Merida; Dr. Gabriel Briceño Ricón, Trujillo; Dr. Luis Betancourt, La Guayra; Dr. Francisco E. Bustamente, Maracaibo; Dr. Paulino Balbuena, Puerto Cabello; Dr. Rómulo D'Aubeterre, Cumana; Dr. Pedro Luis Briceño Martín, Maturin; Dr. Cesar Espino, Barcelona; Dr. Manuel A. Fonseca, Valencia; Dr. Arnaldo Morales, Ciudad de Cura; Dr. Antonio María Pineda, Barquisimeto.

Vermont.—Dr. H. D. Holton, Brattleboro, member of national committee on organization; Dr. M. R. Crain, Rutland County Medical Society; Dr. E. B. Campbell, Windham County Medical Society; Dr. D. C. Hawley, Chittenden County Medical Society; Dr. Ralph Sherwood, Franklin County Medical Society; Dr. W. D. Huntington, Windsor County Medical Society; Dr. C. L. Erwin, Orleans County Medical Society; Dr. D. G. Kemp, Washington County Medical Society; Dr. J. D. Folsom, Caledonia County Medical Society.

Virginia.—Dr. J. S. Wellford, Richmond, member national committee on organization. For the local profession: Dr. W. C. Dabney, Charlottesville; Dr. L. B. Anderson, Norfolk; Dr. S. W. Carmichael, Fredericksburg; Dr. R. F. Hicks, Warrenton; Dr. J. A. Gayle, Roanoke; Dr. W. F. Barr, Abingdon; Dr. L. B. Edwards, Richmond; Dr. S. W. Budd, Petersburg; Dr. H. M. Patterson, Staunton.

West Virginia.—Dr. J. H. Brownfield, Fairmount, member national committee on organization. For the local profession: Dr. L. D. Wilson, Wheeling; Dr. T. A. Harris, Parkersburg; Dr. W. P. Hogue, Charleston.

Wisconsin.—Dr. J. T. Reeve, Appleton, member of the national committee on organization. Dr. A. J. Hosmer, Ashland Medical Society; Dr. C. S. Sheldon, Central Wisconsin Medical Society; Dr. P. H. Letourneau, Chippewa County Medical Society; Dr. F. D. Bentley, Columbia County Medical Society; Dr. T. T. Beveredge, Fox River Valley Medical Society; Dr. F. Robert Zeit, German Northwestern Medical Society; Dr. F. M. Eply, Inter-Co. Medical Society; Dr. F. S. Luhmann, Manitowoc County Medical Society; Dr. J. Simonsin, Northwestern Wisconsin Medical Society; Dr. C. M. Gould, Pierce County Medical Society; Dr. W. Hausmann, Brainard Medical Society; Dr. Edward Kovats, Society of German Physicians; Dr. C. D. Conkey, Douglass County Medical Society; Dr. N. O. B. Wingate, health department of Milwaukee; Dr. W. A. Batchelor, Milwaukee Medical Society.

Wyoming.—Dr. J. H. Finfrock, Laramie City, member national committee on organization. For local profession: Dr. J. J. Marston, Cheyenne; Dr. M. C. Barkwell, Cheyenne; Dr. T. G. Ricketts, Carbon; Dr. E. S. Murray, Rock Springs; Dr. T. G. Maghee, Rawlins; Dr. W. A. Hocken, Evanston; Dr. J. C. Watkins, Buffalo; Dr. J. M. Wilson, Douglas; Dr. H. L. Squire, Sundance; Dr. H. M. Bennett, Saratoga.

MEDICAL JOURNALS TO WHICH THE OFFICIAL BULLETINS OF THE CONGRESS WERE REGULARLY FURNISHED.

Alabama.—The Alabama Medical and Surgical Age, Jno. C. LeGrand, 1014 Noble street, Anniston.

Argentine Republic.—Anales del Círculo Médico Argentino, Dr. Samuel Gache, editor, Lavalle 725, Buenos Aires; Anales de la Asistencia Pública, Dr. José Penna, editor, Rivadavia 1167, Buenos Aires; Anales del Departamento Nacional de Higiene, Drs. Pedro N. Arata and Emilio R. Coni, editors, 25 de Mayo 273, Buenos Aires; Boletin de Sanidad Militar, Drs. Alberta Costa and José M. Cabezin, editors, Hospital Militar, Buenos Aires; La Salud, Dr. J. M. Franceschi, editor, Chivilcoy; Revista de la Sociedad Nacional de Farmacia (anonymous), Esmeralda 591, Buenos Aires; Revista Médica de la Plata, Drs. Bas, Arce, Peñalva, Alexander, Gallastegui, and Ferrand, editors, La Plata.

Brazil.—Annaes da Academia de Medicina do Rio de Janeiro, Drs. A. J. Souza Lima and Alfredo Piragibe, editors, Rio de Janeiro; Boletins da Academia de Medicina, Drs. A. J. Souza Lima and Alfredo Piragibe, editors, Rio de Janeiro; Brazil Médico [weekly], Dr. Azavedo Sodré, editor, Rio de Janeiro; União Medica, Dr. João Drummond, editor, Rio de Janeiro; Annuario Medico Brasileiro, Dr. Carlos Costa, editor, Rio de Janeiro; Revista dos Cursos Praticos e Theoricos da Faculdade de Medicina e Cirurgia de Rio de Janeiro, Drs. Benicio de Abreu, Rocha F. João M. Teixeira, Oscar Bulhões, Jose Paulo, editors; Gazeta Medica da Bahia, Dr. Pacifico Pereira, Bahia; Boletins da Sociedade de Medicina e Cirurgia de Rio de Janeiro, Dr. Jorge Franco, editor. Rio de Janeiro; Boletins da Sociedade de Medicina e Cirurgia de Juiz de Fora, Drs. Eduardo de Menzes and Goncalves Penna Filho, editors, Juiz de Fora; Revista do Gremio dos Internos dos Hospitaes do Rio de Janeiro, Drs. Carlos Seidl, Modesto Guimaraes and Adolpho Possolo, editors, Rio de Janeiro.

California.—Southern California Practitioner, Dr. H. Bert Ellis, Los Angeles; Pacific Health Journal, Dr. J. N. Loughborough, 1059 Castro, Oakland; Occidental Medical Times, James H. Parkinson, 429½ I, Sacramento; Pacific Medical Journal, Dr. D. A. Hodghead, 522 California, San Francisco.

Canada.—The Canadian Practitioner, Dr. Adam H. Wright, editor, Toronto, Ontario; The Canada Lancet, Drs. J. L. Sevison and C. Sheard, Toronto, Ontario; The Montreal Medical Journal, Drs. George Ross, Thomas G. Roddick, and James Stewart, Montreal, Quebec; The Canada Medical Record, Drs. A. Lapthorn Smith, F. Wayland Campbell, and Rollo Campbell, Montreal, Quebec; La Gazette Médicale, Montreal, Quebec; The Maritime Medical News, Halifax, Nova Scotia; L'Union Médicale du Canada, Drs. J. B. A. Lamarche, H. E. Desvosiers, and M. T. Brennan, Montreal, Quebec.

Chile.—Revista Médica, Dr. Sancristobal, editor, Santiago de Chile; Boletin de Medicina, Dr. Octavio Maira, editor, Santiago de Chile; Anales de Farmacia, Angel Vasquez, editor, Santiago de Chile; Revista Farmacéutica Chilena, Adolfo Larenas, editor, Santiago de Chile.

Republic of Colombia.—Revista Médica, Drs. Abraham Aparicio and Cárlos Michelsen, editors, Bogota; Revista de Higiene, Dr. Gabriel Duran Borda, editor, Bogota; Boletin de Medicina del Cauca, Dr. Daniel Quijana Wallis, editor, Cali; Anales de la Academia de Medicina de Medellin (anonymous), Medellin.

Colorado.—Denver Medical Times, Dr. Thomas H. Hawkins, 1657 Arapahoe, Denver.

Connecticut.—New England Medical Monthly, Dr. Wm. C. Wile, 7 Delay, Danbury; The Quartely Journal of Inebriety, Dr. T. D. Crothers, Fairfield avenue, Hartford.

Costa Rica.—La Gaceta, San José; El Maestro, San José.

Cuba.—Anales de la Academia de Ciencias, Havana; Crónica Médico-Quirúrgica, Dr. Juan Santos Fernandez, editor, Havana; Revista de Ciencias Médicas, Dr. Joaquin Jacobson, editor, Havana; Progreso Médico, Dr. Gabriel Casuso, editor,

Havana; La Higiene, Dr. Manuel Delfin, editor, Havana; El Repertorio Médico, Dr. Antonio Gonzalez Curguezo, editor, Havana.

Georgia.—Atlanta Medical and Surgical Journal, Dr. M. B. Hutchins, P. O. box 431, Atlanta; Southern Medical Record, A. W. Griggs, 29 N. Forsyth, Atlanta; The Dixie Doctor, Dr. T. H. Huzza, 2½ Marietta, Atlanta.

Guatemala.—Memoria de la Facultad de Medicina y Farmacia del Centro, Dr. Samuel Gonzalez, editor, Guatemala City; Memoria de la Facultad de Medicina y Farmacia de Occidente, Dr. Encon Mora, editor, Quezaltenango; Gaceta Médica Quezalteca, Dr. Encon Mora, editor, Quezaltenango.

Illinois.—Journal of the American Medical Association, Dr. J. C. Culbertons, 68 Wabash avenue, Chicago; Medical Standard, Dr. James G. Kiernan, 834 Opera House Block, Chicago; North American Practitioner, Dr. Bayard Holmes, 75 Wabash avenue, Chicago; Sanitary News, A. H. Harryman, 90 La Salle, Chicago; Western Medical Reporter, Dr. John E. Harper, 163 State, Chicago; Peoria Medical Monthly, Dr. Thomas M. McIlvaine, Peoria.

Indiana.—Fort Wayne Journal of the Medical Sciences, Drs. C. B. and George Steemen, 95 Calhoun, Fort Wayne; Journal of the National Association of Railway Surgeons, Christian B. Steemen, Fort Wayne; Indiana Medical Journal, Dr. Frank C. Ferguson, 19 W. Ohio, Indianapolis.

Iowa.—Iowa State Medical Reporter, Dr. F. E. Crittenden, Des Moines.

Kansas.—Kansas Medical Journal, Dr. John E. Minney, 723 Kansas avenue, Topeka.

Kentucky.—Medical Progress, Dr. Robert C. Kenner, 315 Commerce Building, Louisville; American Practitioner and News, Dr. D. W. Yandell, 440 W. Main, Louisville; Medical Herald, Dr. Edward Miller, 327 Third avenue, Louisville.

Louisiana.—New Orleans Medical and Surgical Journal, Dr. G. B. Lawrason, 153 Canal, New Orleans.

Maryland.—Maryland Medical Journal, A. K. Bond, 209 Park avenue, Baltimore.

Massachusetts.—Annals of Gynæcology, Dr. E. W. Cushing, 168 Newbury, Boston; Boston Medical and Surgical Journal, Dr. George B. Shattuck, 283 Washington, Boston.

Mexico.—La Gazeta Médica, Dr. Manuel S. Soriana, editor, City of Mexico; La Revista Médica de México, Dr. José Ferrer, editor, City of Mexico; La Escuela de Medicina, Dr. Adrian de Garay, editor, City of Mexico; La Revista Médica de Puebla, Dr. Miguel Solas, editor, city of Puebla; Boletin del Hospital General de Puebla, Dr. Francisco Morin, editor, city of Puebla; El Estudio, Dr. Secundino E. Sosa, editor, City of Mexico.

Michigan.—The Physician and Surgeon, Dr. J. W. Keating, Ann Arbor; Pharmaceutical Era, Charles W. Parsons, 99 Woodward avenue, Detroit; Bulletin of Pharmacy, Dr. B. W. Palmer, Detroit; American Lancet, Dr. Leartus Connor, 103 Car, Detroit; Leonard's Illustrated Medical Journal, Dr. C. Henri Leonard, 18 John R. Detroit; Medical Age, Dr. B. W. Palmer, P. O. box 470, Detroit.

Minnesota.—Northwestern Lancet, Dr. A. J. Stone, Union Block, St. Paul.

Missouri.—St. Joseph Medical Herald, Dr. Hiram Christopher, St. Joseph; Alienist and Neurologist, Dr. C. H. Hughes, 500 N. Jefferson, St. Louis; American Journal of Ophthalmology, Dr. Adolph Alt, 914 Locust, St. Louis; Annals of Surgery, Dr. L. S. Pilcher, 914 Locust, St. Louis; Medical Brief, Dr. J. J. Lawrence, Ninth and Olive, St. Louis; Medical Mirror, Dr. I. N. Love, Grand avenue, St. Louis; The Medical Fortnightly, Dr. Brandsford Lewis, 1006 Olive, St. Louis; St. Louis Medical and Surgical Journal, Dr. F. L. James, St. Louis; Weekly Medical Review, Dr. Frank L. James and Dr. A. H. Ohmann-Dumesnil, 615 Locust, St. Louis.

Nebraska.—Omaha Clinic, Dr. George Wilkinson, Karhack Block, Omaha.

New York.—Albany Medical Annals, Albany; Brooklyn Medical Journal, Dr. Joseph H. Raymond, 356 Bridge, Brooklyn; The Sanitarian, Dr. A. N. Bell, 291 Union street, Brooklyn; Buffalo Medical and Surgical Journal, Dr. W. W. Potter, 284 Franklin, Buffalo; American Druggist, 56 Lafayette Place, New York; La Revista

Médico—Quirúrgica, Dr. Samuel E. Millikin and Dr. Pedro J. Salicrup, 126 Liberty street, New York; American Journal of Obstetrics, Dr. Brooks H. Wells, 56 Lafayette Place, New York; Domestic Gazette, W. F. Waugh, 447 Greenwich, New York; Gaillard's Medical Journal, Dr. G. T. Harrison, P. O. box 1124, New York; La Gaceta Médico Farmacéutica, Johnson & Johnson, 92 William, New York; Hall's Journal of Health, Nelson Cross, 340 W. Fifty-ninth, New York; Herald of Health, Dr. George Henry Bassett, P. O. box 2141, New York; International Journal of Surgery, Dr. Ferdinand King, 95 William, New York; Doctor's Weekly, Dr. Ferdinand King, 315 W. Sixty-third, New York; Journal of Balneology, Dr. A. L. A. Tabolett, P. O. box 1670, New York; Journal of Cutaneous and Genito-Urinary Diseases, Dr. P. A. Morrow, 3 Bond, New York; Journal of Nervous and Mental Diseases, Dr. Charles Henry Brown, 25 W. Forty-fifth, New York; Journal of Syphiology and Dermitology, Dr. Morris H. Henry, 531 Fifth avenue, New York; New York Medical Journal, Dr. Frank P. Foster, 3 Bond, New York; New York Medical Record, Dr. George F. Shrady, 56 Lafayette Place, New York; Medical Missionary Record, George D. Dowkontt, 118 Forty-fifth, New York; American Journal of Insanity, Dr. George Adler Bloomer, Utica; New York Journal of Gynæcology Obstetrics, Dr. J. Duncan Emmet, 91 Madison avenue, New York.

North Carolina.—North Carolina Medical Journal, Dr. Thomas F. Wood, 201 Chestnut, Wilmington.

Ohio.—Cincinnati Medical Journal, Dr. Gilbert I. Cullen, 478 West Sixth, Cincinnati; Lancet and Clinic, Dr. J. C. Culbertson, 199 West Seventh, Cincinnati; Cleveland Medical Gazette, Dr. A. R. Baker, 143 Euclid avenue, Cleveland; Columbus Medical Journal, Dr. J. F. Baldwin, 112 West Fourth, Columbus; Medical Compend, Dr. H. G. Blaine, 902 Adams, Toledo.

Pennsylvania.—American Journal of the Medical Sciences, Dr. E. P. Davis, Philadelphia; Annals of Hygiene, Dr. Joseph F. Edwards, Philadelphia; Archives of Pædiatrics, Dr. William Perry Watson, 715 Market, Philadelphia; College and Clinical Record, Dr. Richard J. Dunglison, Philadelphia; Medical News, Dr. G. M. Gould, 706 Sansom, Philadelphia; Medical World, Dr. C. F. Taylor, 1520 Chestnut, Philadelphia; Medical and Surgical Reporter, Dr. E. T. Reichert, northeast corner Thirteenth and Walnut, Philadelphia; Times and Register, Dr. William F. Waugh, 1725 Arch, Philadelphia; Pittsburg Medical Review, Dr. X. O. Werder, 924 Pennsylvania avenue, Pittsburg; Therapeutic Gazette, Dr. H. A. Hare, 22 South Fifteenth, Philadelphia.

Peru.—La Crónica Médica, Lima; El Monitor Médico, Lima.

San Salvador.—La Universidad, San Salvador; Repertorio Salvadoreño, San Salvador.

Tennessee.—Memphis Medical Monthly, Dr. F. L. Sim, 126 Hernando, Memphis; Journal of Medicine and Surgery, Dr. C. S. Briggs, 313 Church, Nashville; Southern Practitioner, Dr. Deering J. Roberts, 218 Russell, Nashville.

Texas.—Daniel's Texas Medical Journal, Dr. F. E. Daniel, 510 Rio Grande, Austin; Texas Health Journal, J. R. Briggs, 903 Elm, Dallas.

Venezuela.—La Union Médica, Caracas; Revista Científica de la Universidad Central, Caracas.

Virginia.—The Virginia Medical Monthly, Landon B. Edwards, Richmond, Va.

Dental journals.

Dental Cosmos, Philadelphia; Dental Review, Chicago; Dental Register, Dr. J. Taft, Cincinnati; Dental Head-Light, Dr. W. C. Barrett, Buffalo, N. Y.; International Dental Journal, Philadelphia; Western Dental Journal, Kansas City, Mo.; American Journal of Dental Science, Baltimore; Ohio State Dental Journal, Toledo, Ohio; Dominion Dental Journal, Dr. W. G. Beers, Montreal, Canada; Southern Dental Journal, Atlanta, Ga.

FINAL REPORT OF THE COMMITTEE ON PERMANENT ORGANIZATION OF THE PAN AMERICAN MEDICAL CONGRESS TO THE AMERICAN MEDICAL ASSOCIATION.

MILWAUKEE, WIS., *June 6, 1893.*

To the American Medical Association:

Your committee, appointed at Washington to effect a permanent organization of an intercontinental American medical congress, begs leave to submit its final report as follows:

An organization has been effected under the style and title of the Pan American Medical Congress, to be held at the City of Washington, D. C., September 5, 6, 7, and 8, A. D. 1893, under the presidency of Prof. William Pepper, M. D., LL. D., of Philadelphia. The details of the organization are set forth in the published preliminary announcement of the Congress, copies of which are respectfully submitted herewith, in both English and Spanish, as a part of this report.

Since the publication of this preliminary announcement an organization has been effected in Paraguay. Your committee is therefore pleased to state that an organization of the Pan American Medical Congress exists in every State and Territory of the United States and in every remaining country and colony of the Americas, including the West Indies and Hawaii.

A provision has been adopted since the foregoing publication whereby every medical society, national, colonial, and local, has been made a constituent organization of the Congress.

The committee begs leave to report further that the organization which has been effected as above, by the authority you have conferred upon it, has been and is already very actively engaged in carrying out the practical ends of the Congress.

The Senate and House of Representatives at the first session of the last Congress adopted a joint resolution authorizing the President to extend an invitation to the governments of the Western Hemisphere to send official delegates to the meeting, and to appoint similar delegates on behalf of our own Government. This official invitation has been issued through the Department of State, and all replies so far received have been in the nature of acceptances. The President has indicated that the Government of the United States will be represented at the Congress by 6 delegates. At the last meeting of the executive committee of the congress a resolution was adopted directing that in view

of the Columbian exercises in progress in America this year, and in view of the relations which have become intimate between the United States and Spain, that the Government of the latter country be requested to send delegates to the congress. It was thought that the exceptional relations of amity existing between the two countries would warrant a course which has been avoided with regard to all other European countries out of deference to the interests of the international congress which is to meet in Rome.

The National Congress at its last session appropriated fifteen thousand dollars ($15,000) for the purposes of entertainment of the meeting.

The President of the United States has consented to open the congress in person and to extend the courtesy of a reception at the White House to delegates and their families.

A special feature of the congress will be the proceedings of the sections on hygiene, climatology, and demography, and on marine and hygiene and quarantine. The proceedings of these sections will be largely of the nature of a sanitary conference with particular reference to practical questions of public health and of imminent importance.

With this object in view, every municipality of the three Americas, including the West Indies and Hawaii, has been invited to send an official delegate, and a very large number of acceptances have already been received.

The titles of several hundred papers, accompanied in many instances with abstracts, have already been received from representative medical writers in the English, Latin, French, and Portugese countries. This of itself assures the scientific success of the congress.

Invitations have been extended to representative European scientists to be the guests of the congress, and a number of acceptances have been received.

In conclusion, your committee begs leave to express its appreciation of the spontaneous response to its appeal for funds in the form of advance registration fees from the public-spirited representatives of our profession in America. Let it be remembered, no registration fees will be accepted from members of the congress residing outside the United States. Although money has been realized from advance registrations in amount sufficient to pay some of the preliminary expense of organization, a still larger sum is needed with which to meet accumulated obligations.

It should be held in mind that the Congressional appropriation, meager as it is, will be available only for purposes of entertainment at the time of the meeting, and that the expense involved in publication, correspondence, and clerical work is necessarily very heavy and must be met at once. The members of the profession are therefore again urgently requested to register at once by paying the fee ($10) to the treasurer, Dr. A. M. Owen, Evansville, Ind. Those who thus become members of the congress, but who may be prevented from attending

the meeting, will receive a set of the transactions, which of themselves promise to be worth more than the amount of the registration fee.

In submitting this, its final report, your committee begs leave to thank the association and its executive officers for cordial support and the medical press for its energetic and efficient aid in promoting this earnest movement for the unification of the medical profession of all the Americas.

Respectfully submitted on behalf of the committee.

CHARLES A. L. REED,
Chairman.

REGISTERED DELEGATES.

Name.	Residence.	Delegate from—
Isaac E. Atkinson	Baltimore, Md	University of Maryland.
H. W. Austin	U. S. Marine-Hospital Service.	United States Marine-Hospital Service.
George N. Acker	Washington, D. C	Medical Society, District of Columbia.
Samuel S. Adams	Washington, D. C	Medical Society, District of Columbia.
Zabdiel Boylston Adams	Framingham, Mass	The State of Massachusetts, by appointment by the governor.
J. Dennis Arnold	San Francisco, Cal	San Francisco County Medical Society.
Florestan Aguilar	Cadiz, Spain	"La Odontologia."
Gueterrez y Arango	Santander, Colombia	The Government of the Republic of Colombia; the Government of the Department of Cauca; Sociedad de Medicina del Cauca.
Leonard Ballou Almy	Norwich, Conn	The State of Connecticut, by appointment by the governor.
Albert Anderson	Wilson, N. C	North Carolina State Medical Society.
Joseph W. Anderson	Ardmore, Pa	Montgomery County (Pa.) Medical Society.
Howard Emerson Ames	Washington, D. C	United States Navy.
James M. Andres	Philadelphia, Pa	Medico-Chirurgical College.
John S. Anvim	Columbus, Ind	The State of Indiana, by appointment by the governor.
Lawrence Ashton	Dallas, Texas	Texas State Medical Association.
John B. Baggett	Washington, D. C	Medical Association, District of Columbia.
Henry B. Baker	Lansing, Mich	State of Michigan, by appointment by the governor.
A. R. Baker	Cleveland, Ohio	Cuyahoga County (Ohio) Medical Society.
H. H. Barker	Washington, D. C	Medical Association, District of Columbia.
Amy S. Barton	Philadelphia, Pa	Woman's Medical College of Pennsylvania.
John N. Baskett	Hannibal, Mo	State of Missouri, by appointment by the governor.
Joseph D. Bryant	New York	Bellevue Hospital Medical College.
Edwin Bentley	Little Rock, Ark	Arkansas Industrial University, Medical Department.
Darby Bergin	Cornwall, Ontario	Surgeon-General of Canada.
A. C. Bernays	St. Louis, Mo	Marion Sims Medical College.
Henry G. Beyer	Annapolis, Md	United States Navy.
John S. Billings	Washington, D. C	United States Army.
Seth Scott Bishop	Chicago, Ill	Illinois Charity Eye and Ear Infirmary.
Alexander B. Blackader	Montreal, Canada	McGill University.
J. Mount Bleyer	New York	New York County Medical Society.
Eugene Boise	Grand Rapids, Mich	City of Grand Rapids, appointed by the mayor.
Henry F. Borden	Brockton, Mass	Massachusetts Medical Society.
James P. Boyd	Albany, N. Y	Albany Medical College.
Alexander B. Briggs	Ashaway, R. I	Rhode Island State Board of Health.
Charles W. P. Brock	Richmond, Va	National Association of Railway Surgeons.

REGISTERED DELEGATES—Continued.

Name.	Residence.	Delegate from—
Daniel R. Brower	Chicago, Ill	The State of Illinois, by appointment by the governor.
Hawkins Brown	Hustonville, Ky	The State of Kentucky, by appointment by the governor.
Seneca B. Brown	Fort Wayne, Ind	Indiana Dental College.
Valentine Brown	Yonkers, N. Y	The city of Yonkers, N. Y., appointed by the mayor.
Albert P. Brubaker	Philadelphia, Pa	Jefferson Medical College.
Samuel W. Bogan	Washington, D. C	Columbian University.
Peter H. Bryce	Toronto, Canada	Provincial Board of Health.
Daniel S. Burr	Binghamton, N. Y	City of Binghamton, appointed by the mayor.
John J. Burroughs	Houston, Tex	Texas State Medical Association.
Samuel C. Busey	Washington, D. C	Medical Association, District of Columbia.
J. Wellington Byers	Charlotte, N. C	Charlotte Academy of Medicine.
James Campbell	Hartford, Conn	The State of Connecticut, by appointment by the governor; and the city of Hartford, by appointment by the mayor.
Henry W. Cattell	Philadelphia, Pa	Institution for Feeble-Minded Children, at Elwyn.
Charles G. Cannaday	Roanoke, Va	The State of Virginia by appointment by the governor.
Roland G. Curtin	Philadelphia, Pa	American Climatological Association.
Manuel Carmona y Vâlle	City of Mexico	The State of Tamaulipas.
José Clairac	Havana	The Spanish Government.
Auguste Comean	Port au Prince, Haiti	The Haitien Government.
J. Henry Carstens	Detroit	Detroit Gynecological Society.
William S. Carter	Philadelphia, Pa	The University of Pennsylvania.
H. R. Carter	U. S. Marine-Hospital Service.	The United States Marine-Hospital Service.
Silas J. Cartwright	Roxbury, N. Y	Delaware County (N. Y.) Medical Society.
John J. Castellanos	New Orleans, La	Orleans Parish (La.) Medical Society.
David Cerna	Galveston, Tex	Texas State Medical Association.
James Collins	Philadelphia, Pa	Philadelphia County Medical Society.
Samuel Powers Carbee	Haverhill, N. H	State of New Hampshire, by appointment by the governor.
Julian J. Chisolm	Baltimore, Md	The University of Maryland.
Russell H. Chittenden	New Haven, Conn	Yale University.
John Herbert Claiborne	Petersburg, Va	The Commonwealth of Virginia, by appointment by the governor.
Augustus P. Clarke	Boston, Mass	The State of Massachusetts, by appointment by the governor.
N. D. Clouser	Hartford City, Ind	Blackford County (Ind.) Medical Society.
Wm. H. H. Cobb	Goldsboro, N. C	State of North Carolina, by appointment by the governor.
Anton Coe	Washington, D. C	Medical College of Columbia University.
Henry L. Coit	Newark, N. J	Essex District Medical Society.
P. C. Coleman	Colorado, Texas	Texas State Medical Association.
Cornelius G. Comegys	Cincinnati, Ohio	Cincinnati Hospital and Academy of Medicine.
Granville P. Conn	Concord, N. H	Appointed by the governor of New Hampshire to represent the State Board of Health, Dartmouth Medical College.

REGISTERED DELEGATES—Continued.

Name.	Residence.	Delegate from—
Phineas S. Conner	Cincinnati, Ohio	The Medical College of Ohio; Dartmouth Medical College.
Angel Contreras	Puebla, Mexico	The State of Yucatan.
Albert C. Corr	Carlinville, Ill	The State of Illinois, by appointment by the governor.
Berton H. Criley	Dallas Center, Iowa	The State of Iowa, by appointment by the governor.
John Cronyn	Buffalo, N. Y	Medical Department of Niagara University.
Thomas D. Crothers	Hartford, Conn	Walnut Lodge Hospital.
Hannah L. Croasdale	Philadelphia, Pa	Woman's Medical College of Philadelphia.
Frederic Colton Curtis	Albany, N. Y	Albany Medical College.
Ernst W. Cushing	Boston, Mass	Massachusetts Medical Society.
Wm. C. Cutler	Chelsea, Mass	The city of Chelsea, appointed by the mayor.
Juan Martinez del Campo.	City of Mexico	The State of Zacatecas.
Wm. C. Dabney	University of Virginia.	University of Virginia.
Sam'l S. Davis	Lancaster, Pa	Appointed by the Governor of Pennsylvania to represent the State board of health.
John Isaac Darby	Americus, Ga	The State of Georgia by appointment by the governor.
Wm. J. G. Dawson	St. Helena, Cal	Napa County (Cal.), Medical Society.
A. W. de Roaldes	New Orleans, La	The State of Louisiana by appointment by the governor. Orleans Parish Medical Society.
William Dougall	Joliet, Ill	Will County (Ill.) Medical Society.
Charles Duffy	Newbern, N. C	The State of North Carolina by appointment by the governor.
George Douglas	Oxford, N. Y	The New York State Medical Association.
Columbus Drew	Jacksonville, Fla	Florida State Medical Association and the city of Jacksonville.
E. A. de Schweinitz	Washington, D. C	The Medical College of Columbian University.
William Edgar Driscoll	Muncie, Ind	The State of Indiana by appointment by the governor.
Francis X. Dercum	Philadelphia, Pa	Jefferson Medical College.
Mary Gage Day	Wichita, Kans	Wichita Medical Society.
G. Edgar Dean	Scranton, Pa	Lackawanna County (Pa.) Medical Society.
D. Bryson Delavan	New York	American Laryngological Association (president).
P. Gourdin De Saussure	Charleston, S. C	Medical College of the State of South Carolina.
Wm. B. Dewees	Salina, Kans	The State of Kansas by appointment by the governor.
Jose M. de Ita	Puebla, Mexico	The Maternity Hospital.
Charles E. Doubleday	Penn Yan, N. Y	Yates County (N. Y.) Medical Society.
Cyrus Edson	New York	The city of New York, appointed by the mayor.
Henry W. Elmer	Bridgeton, N. J	Cumberland County (N. J.) Medical Society.
Thomas B. Earley	Philadelphia, Pa	Medico-Chirurgical College.
W. J. Eddy	Shelbyville, Ill	Shelby County (Ill.) Medical Society.
Landon B. Edwards	Richmond, Va	The State of Virginia by appointment by the governor.

REGISTERED DELEGATES—Continued.

Name.	Residence.	Delegate from—
William H. Elliott	Savannah, Ga	The State of Georgia by appointment by the governor.
Harold C. Ernst	Boston, Mass	Harvard University Medical School.
George Evans	New York	Baltimore College of Dental Surgery.
Charles Henry Eyles	Belize, British Honduras.	The Government of British Honduras.
Robert Farnham	Washington, D. C	Medical Association of the District of Columbia.
George E. Falls	Buffalo, N. Y	Niagara Medical College.
Joseph Benson Fenwick	Chelsea, Mass	City of Chelsea, appointed by mayor.
C. G. J. Finn	New York, N. Y	Queen County Medical Society.
Frank Finney	La Junta, Colo	Atchison, Topeka and Santa Fe Railway Hospital Association.
Samuel A. Fisk	Denver, Colo	Medical Department University of Denver.
T. V. Fitzpatrick	Cincinnati, Ohio	Cincinnati College of Medicine and Surgery.
Chas. F. Flanders	Manchester, N. H	New Hampshire State Medical Society.
De Saussure Ford	Augusta, Ga	Medical Department University of Georgia.
Felix Formento	New Orleans, La	State board of health.
Otto E. Farster	St. Louis, Mo	City of St. Louis, appointed by mayor.
J. L. Forwood	Chester, Pa	University of Pennsylvania.
W. H. Forwood	Washington, D. C	U. S. Army.
Romulus Adams Foster	do	Columbian University.
F. W. Frankhauser	Reading, Pa	City of Reading, appointed by mayor.
Wm. Alexander Frazier	Staunton, Va	Medical Society of Virginia.
Erskine B. Fullerton	Columbus, Ohio	Starling Medical College.
Albert Leary Gihon	Hotel Richmond, Washington, D. C.	U. S. Navy.
George M. Gould	Philadelphia, Pa	Medical News.
David Wilson Graham	Chicago, Ill	Illinois State Medical Society.
Amus Graves	San Antonia, Tex	National Association Railway Surgeons.
Robert Willard Greenleaf.	Boston, Mass	Massachusetts College of Pharmacy.
Richard F. Gundry	Catonsville, Md	The R. Gundry Home for Mental and Nervous Diseases.
Manuel Gutiewiz	Mexico City, Mexico	The State of Oajaca, Mexico.
Grant Bey	Cairo, Egypt	The Medical Service of the Khedive of Egypt.
Daniel M. Gluiteras	Washington, D. C	U. S. Navy.
Isaac C. Gable	York, Pa	York County (Pa.) Medical Society.
A. C. George	Washington, D. C	U. S. Navy, Medical Department.
Sam'l M. Garlik	Bridgeport, Conn	City of Bridgeport, Conn.
Alonzo Garcelon	Lewiston, Me	President-secretary of Medical Jurisprudence.
Edward R Garcia	13 San José de Gracia, Mexico City, Mexico.	The State of Tabasco, Mexico.
Louis A. La Garde	Chicago, Jackson Park, Ill.	U. S. Army.
Joseph Gardner	Bedford, Ind	American Red Cross Association.
Wm. Gardner	Montreal, Canada	McGill University.
Angel Gavino	Mexico City	The State of Morelas, Mexico.
M. W. Gillmer	Bahia, Brazil	The city of Bahia, Brazil.
Alfred Garces	Colombia Republicà	Sociedad de Medicina.
V. L. Gilles	Port au Prince, Haiti	Government of Haiti.

REGISTERED DELEGATES—Continued.

Name.	Residence.	Delegate from—
John L. Heffron	Syracuse, N. Y	Medical Department Syracuse University.
C. R. Holmes	Cincinnati, Ohio	Academy of Medicine of Cincinnati.
Lewis E. Hawie	Danville, Va	The State of Virginia by appointment by the governor.
Joseph H. Hunt	Brooklyn, N. Y.	Brooklyn College of Pharmacy.
John B. Hamilton	Chicago, Ill	The State of Illinois by appointment by the governor.
Hugh Hamilton	Harrisburg, Pa	Dauphin County Medical Society.
Charles W. Hamlin	Middleville, N. Y	Herkimer County (N. Y.) Medical Society.
Philander A. Harris	Paterson, N. J.	Medical Society of New Jersey.
Geo. Byrd Harrison	Washington, D. C	Columbian University.
D. H. Hazen	do	Medical Society of the District of Columbia.
Ernst Hart	London, England	British Medical Association.
Mrs. Ernst Hart	do	Bchelien és-Sciences es lettres of the Faculty of Medicine of Paris.
Edmund Burke Haywood.	Raleigh, N. C	The State of North Carolina by appointment by the governor.
Ferdinand Herff	San Antonio, Tex	State of Texas by appointment by the governor.
Juan Hernandez	San Juan, Porto Rico	Cindad de Jan Juan.
James F. Hibberd, president-elect of the American Medical Association.	Richmond, Ind	American Medical Association (guest of honor).
W. Frank Halhnlen	Philadelphia, Pa	Medico-Chirurgical College.
Clifton F. Hodge	Worcester, Mass	Clark University.
John Van R. Hoff (major)	Governors Island, New York Harbor.	U. S. Army.
Wm. P. Hogue	Charleston, W. Va	Medical Society of West Virginia.
Bayard Holmes	Chicago, Ill	College of Physicians and Surgeons.
J. B. S. Holmes	Rome, Ga	Georgia State Medical Association.
W. E. Hughes	Philadelphia, Pa	University of Pennsylvania.
George Homan	St. Louis, Mo	The city of St. Louis.
Thos. C. Hoover	Columbus, Ohio	Appointed by the governor of Ohio to represent the Ohio State board of health. Starling Medical College.
James G. Hopkins	Thomasville, Ga	The State of Georgia by appointment by the governor.
Alvin A. Hubbell	Buffalo, N. Y.	Medical Department of Niagara University.
Charles H. Hughes	St. Louis, Mo	Barnes Medical College.
D. L. Huntington	U. S. Army	U. S. Army.
E. Fletcher Ingals	Chicago, Ill	Illinois State Medical Society.
B. J. D. Irwin	do	U. S. Army.
H. L. E. Johnson	Washington, D. C	Washington Gynecological Society.
W. T. Jenkins	Quarantine Station, N. Y.	Health officer of port, New York.
Antonio Jover	Havana, Cuba	University of Havana.
Walter B. Johnson	Paterson, N. J	American Medical Association.
Dean G. Kemp	Montpelier, Vt	State of Vermont.
Fred B. Kilmer	New Brunswick, N. J	City of New Brunswick and New Jersey Pharmaceutical Society.
Elijah S. Kelley	Minneapolis, Minn	Health commissioner, Minneapolis.
George M. Kelly	Washington, Pa	Washington Medical Society.

REGISTERED DELEGATES—Continued.

Name.	Residence.	Delegate from—
George T. Kemp	Johns Hopkins University, Baltimore, Md.	Hoagland Laboratory.
Peter D. Keyser	Philadelphia, Pa	City of Philadelphia and board of health, City of Philadelphia.
Charles W. Kollock	Charleston, S. C	Charleston Medical School.
George A. Ketcham	Mobile, Ala	Medical College of Alabama.
James K. King	Watkins, N. Y	County Medical Society.
A. F. A. King	Washington, D. C	Medical department, University of Vermont.
J. Ferd. Klinedinst	York, York County, Pa.	Medico-Pathological Society.
J. Rollo Knapp	New Orleans, La	Louisiana State Dental Society.
William F. Knox	McKeesport, Pa	Allegheny County (Pa.) Medical Society.
Pedro Lagleyze	Buenos Ayres, Arg. Rep	The Argentine Republic.
Enrique Lopez	Havana, Cuba	Sociedad de Estudios Clinicos.
Damaso Lainé	Media, Pa	Delaware County (Pa.) Medical Society.
Daniel S. Lamb	Washington, D. C	U. S. Army Medical Museum.
Ernest Laplace	Philadelphia, Pa	Medico-Chirurgical College.
John A. Larrabee	Louisville, Ky	Hospital College of Medicine.
Henry W. Latham	Latham, Mo	Central Missouri Medical Society.
Thomas S. Latimer	Baltimore, Md	College of Physicians and Surgeons.
Rafael Lavista	City of Mexico	Government of Mexico.
Richard Henry Lewis	Raleigh, N. C	North Carolina Board of Health.
William Patrick Lawler	Lowell, Mass	Lowell Board of Health.
Benjamin Lee	Philadelphia	Appointed by the governor of the State of Pennsylvania to represent the State Board of Health.
Charles Lehlbach, jr	Newark, N. J	Newark board of health.
Francis B. Loring	Washington, D. C	Medical Department Howard University.
Eugene R. Lewis	Kansas City, Mo	National Association Railway Surgeons.
E. Liceaga	City of Mexico	State of Guanajuato, Mexico.
George N. Lowe	Randall, Kans	Republican Valley Medical Society.
John H. Lowman	Cleveland, Ohio	Medical department, Western Reserve University.
Charles H. Lindsley	New Haven, Conn	Appointed by the governor of Connecticut for the State Board of Health of Connecticut.
David Lobo	Caracas, Venezuela	University of Caracas.
James E. Logan	Kansas City, Mo	Academy of Medicine.
I. N. Love	St. Louis, Mo	Mississippi Valley Medical Association.
V. C. Lucas	Cleveland, Ohio	Cuyahoga County Medical Society.
John Nolan Mackenzie	Baltimore, Md	Johns Hopkins University.
Philip Marvel	Atlantic City, N. J	Atlantic County (N. J.) Medical Association.
A. B. Macallum	Toronto, Canada	Toronto University.
Henry Macdonald	New York City	National Association of Railroad Surgeons.
Willis G. Macdonald	Albany, N. Y	Albany County Medical Society.
Roque Macouzel	City of Mexico	State of Michoacan, Mexico.
Stephen A. Mahoney	Holyoke, Mass	Massachusetts Medical Society.
Thomas H. Manley	New York	Harlem Hospital.
Tomas Casas y Marti	Havana, Cuba	The Spanish Government.
Henry O. Marcy	Boston	Massachusetts Medical Society.
W. V. Marmion	Washington, D. C	Medical Association, District of Columbia.
Francisco Marin	Puebla, Mexico	The State of Chiapas, Mexico.

REGISTERED DELEGATES—Continued.

Name.	Residence.	Delegate from—
Rudolph Matas	New Orleans, La	State of Louisiana, by appointment by the governor. New Orleans Polyclinic.
Thomas J. Mays	Philadelphia	Philadelphia Polyclinic.
G. Mendozabal	Vera Cruz, Mexico	The State of Vera Cruz.
Samuel K. Merrick	Baltimore, Md	Baltimore Medical College.
James H. Mitchell	Cohoes, N. Y	The city of Cohoes, appointed by the mayor.
Adolph W. Miller	Philadelphia, Pa	Philadelphia College of Pharmacy.
Samuel Edwin Milliken	New York	New York Medical Association.
Charles K. Mills	Philadelphia	Philadelphia Neurological Society.
Giles S. Mitchell	Cincinnati	Cincinnati College of Medicine and Surgery.
J. E. Monjaras	San Luis Potosi, Mexico	The State of San Luis Potosi, Mexico.
E. E. Montgomery	Philadelphia, Pa	Jefferson Medical College.
Frederick Montezambert	Quebec	Dominion of Canada.
Luis G. Muñoz	Chihuahua, Mexico	The State of Chihuahua.
Manuel A. Muñez	Lima, Peru	The Peruvian Government.
James Bassett Murdock	Pittsburg, Pa	Western Pennsylvania Medical College.
Alexander J. Mullen, jr	Michigan City	The State of Indiana, by appointment by the governor.
Edward B. Montgomery	Quincy, Ill	Illinois Soldiers and Sailors' Home.
Jennie McCowen	Davenport, Iowa	The State of Iowa, by appointment by the governor.
Joseph D. McCann	Monticello, Ind	The State of Indiana, by appointment by the governor.
Edward Davis McDaniel	Mobile, Ala	Wilcox County (Ala.) Medical Society.
Joseph McFarland	Philadelphia, Pa	University of Pennsylvania.
John I. McLain	Washington, D. C	Medical Association, District of Columbia.
C. Agress McMahan	Evansville, Ind	Vandeberg County Medical Society.
Floyd W. McRae	Atlanta, Ga	Board of health of the city of Atlanta.
Hugh T. Nelson	Charlottesville, Va	State of Virginia by appointment by the governor.
Charles Bliss Noble	Washington, D. C	Washington City Dental Society.
Albert Lane Norris	Cambridge, Mass	Harvard Medical School. Massachusetts State Medical Society.
John T. Nagle	New York, N. Y	Health department of the city of New York.
Frederick G. Navy	Ann Arbor, Mich	Medical department of the University of Michigan.
Dr. Rafael Alvarez Ortez	Havana, Cuba	Sociedad de Higiene of Havana.
John Oenslager, jr	Harrisburg, Pa	Dauphin County Medical Society.
William O'Daniel	Atlanta, Ga	City of Atlanta.
Domingo Orvañanos	Mexico, Mexico	National Medical Institute.
Thomas Opie	Baltimore, Md	College of Physicians and Surgeons.
Thaddeus O. Outerbridge	Bermuda, West Indies	Government of Bermuda, West Indies.
Abraham M. Owen	Evansville, Ind	American Medical Association.
Thomas B. Owings	Ellicott City, Md	State of Maryland, by appointment by the governor.
Guillermo Vargas Paredes.	Bogota, South America	Republic of Colombia, South America.
Richard Henry Plummer	San Francisco, Cal	Cooper Medical College.

REGISTERED DELEGATES—Continued.

Name.	Residence.	Delegate from—
John Asborn Polak	Brooklyn, N. Y	Long Island College Hospital.
Adam Politzer	Vienna, Austria	University of Vienna.
James G. Porteaus	Poughkeepsie, N. Y	New York State Medical Association.
D. Webster Prentiss	Washington, D. C	Medical department, Georgetown University.
F. F. Prewitt	St. Louis, Mo	State of Missouri, appointed by the governor.
Charles O. Probst	Columbus, Ohio	Appointed by the governor to represent the Ohio State Board of Health.
Dr. Juan Padilla	Guatemala City	Guatemala Medical Faculty.
Charles Page	Governor's Island	U. S. Army.
Wm. N. Pencoast	Philadelphia, Pa	Medico-Chirurgical College.
Geo. Farrar Patton	New Orleans, La	Louisiana State Board of Health.
William Peppin	Philadelphia, Pa	University of Pennsylvania.
James Cecil Phillipps	Kingston, West Indies / Jamaica, West Indies.	Medical Council of Kingston.
Lorenzo N. Phinney	Norwalk, Conn	Geneva Medical College.
Ambrosio Grillo y Partmondo.	Santiago, Cuba	Laboratorio Bacteriologico de Santiago de Cuba.
William Peirson	Orange, N. J	Medical Society, State of New Jersey.
Isaac N. Quimby	Jersey City, N. J	New Jersey City Hospital.
Joseph P. Remington	Philadelphia, Pa	Philadelphia College of Pharmacy.
Hermogenes Rivero-Saldiva.	Caracas, Venezuela	Central University.
L. F. Reynaud	New Orleans, La	The State of Louisiana, by appointment by the governor.
Alonzo B. Richardson	Columbus, Ohio	Columbus Asylum for the Insane.
Maurice Howe Richardson.	Boston, Mass	Harvard University.
John B. Roberts	Philadelphia, Pa	Philadelphia Polyclinic.
Henry H. Rusby	New York	College of Pharmacy of the city of New York.
Thos. George Roddick	Montreal, Canada	McGill University.
John O. Roe	Rochester, N. Y	Medical Society of the State of New York.
George H. Rohé	Catonsville, Md	The State of Maryland, by appointment by the governor.
M. Rowe	Deals Island, Md	The State of Maryland, by appointment by the governor.
Eliza H. Root	Chicago, Ill	Northwestern University Woman's Medical School.
Edward K. Root	Hartford, Conn	Connecticut Mutual Life Insurance Company.
Charles A. Ruggles	Stockton, Cal	The State of California, by appointment by the governor.
Luis Hernandez Rubin	Havana, Cuba	Medical Society, Academy of Havana.
Francisco A. Risquez	Caracas, Venezuela	The Government of Venezuela.
Luis E. Ruiz	City of Mexico	The State of Hidalgo.
Frank Gibbs Ryan	Philadelphia, Pa	American Pharmaceutical Association.
Beaven Rake	Trinidad, West Indies	The Government of Trinidad.
Edward Randall	Galveston, Tex	Medical Department, University of Texas.
Augustus Ravogli	Cincinnati, Ohio	The American Medical Association.
Paul S. Redfield	Providence, R. I	Rhode Island State Board of Health.
Henry Redmond	Philadelphia, Pa	The University of Pennsylvania.
John G. Reed	Elmwood Place, Cincinnati, Ohio.	The Union District Medical Society.

REGISTERED DELEGATES—Continued.

Name.	Residence.	Delegate from—
Charles A. L. Reed	Cincinnati, Ohio	The Cincinnati College of Medicine and Surgery.
Elgar Reed	El Monte, Cal	The Alumni Association of Cincinnati, College of Medicine and Surgery.
Howard S. Reeser	Reading, Pa	Berks County (Pa.) Medical Society.
James Edmund Reeves	Chattanooga, Tenn	The State of Tennessee, by appointment by the governor.
John H. Rauch	Chicago, Ill	Journal of the American Medical Association.
William Scott Renner	Buffalo, N. Y	Niagara University.
William A. B. Sellman	Baltimore, Md	Baltimore University, School of Medicine.
Reginald H. Sayre	New York, N. Y	New York State Medical Association.
Thomas Sidney Scales	Mobile, Ala	City of Mobile, appointed by the mayor.
John C. Schapps	Brooklyn, N. Y	St. Mary's Hospital, Brooklyn.
George W. Stoner	U. S. Marine Hospital, Baltimore.	U. S. Marine-Hospital Service.
Robert Lowry Sibbet	Carlisle, Pa	Cumberland County Medical Society.
Charles A. Siegfried	U. S. Naval Training Station, Newport, R. I.	U. S. Navy.
Barton D. Skinner	Greenport, N. Y	Suffolk County, N. Y.
John Philip Slaughter	The Plains, Va	Medical Society of Virginia.
Christian B. Stemen	Fort Wayne, Ind	The State of Indiana, by appointment by the governor; the Wabash Railway Surgical Association.
Robert T. Sloan	Kansas City, Mo	Kansas City District Medical Society.
Charles Smart	U. S. Army	Medical Department, U. S. Army.
Andrew R. G. Smith	North Whitefield, Me	Maine State Board of Health.
Arthur Lapthorn Smith	Montreal, Canada	Medico-Chirurgical Society of Montreal.
Allen J. Smith	Galveston, Tex	Texas Medical Association.
Thos. J. Smith	Bridgeton, N. J	Medical Society of New Jersey.
Robt. Wm. Bruce Smith	Seaforth, Ontario	Royal College of Physicians and Surgeons.
J. Gardner Smith	New York, N. Y	Harlem Medical Association.
J. Lewis Smith	do	Pædiatric Society.
Thos. C. Smith	Washington, D. C	Medical Society of the District of Columbia.
John P. Savage	Cleveland, Ohio	Medical Department of Western Reserve University.
Samuel Edwin Solly	Colorado Springs, Colo.	Colorado State Medical Society.
A. Walter Suiter	Herkimer, N. Y	Medical Society of the State of New York.
Charles Sutherland	Washington, D. C	U. S. Army.
Gottfried Stamm	St. Paul, Minn	City of St. Paul, appointed by the mayor.
Byron Stanton	Cincinnati, Ohio	Appointed by the governor of Ohio to represent the Ohio State Board of Health; the Miami Medical College, Cincinnati.
George I. Stevens	New York, N. Y	American Medical Association.
James A. Stewart	Baltimore, Md	Maryland State Board of Health.
Sarah Hackett Stevenson.	Chicago, Ill	The Woman's Medical College, Chicago.
Charles W. Stiles	Washington, D. C	Bureau of Animal Industry, U. S. Government; Georgetown Medical College.

REGISTERED DELEGATES—Continued.

Name.	Residence.	Delegate from—
David St. John	Hackensack, N. J	New Jersey State Medical Society.
Charles Stover	Amsterdam, N. Y	Medical Society of the State of New York.
John C. Sundberg	Bagdad, Persia	The U. S. consulate at Bagdad.
Jonathan Taft	Cincinnati, Ohio	Dental College, University of Michigan.
T. Oliver Tait	Rochester, N. Y	Monroe County Medical Society.
Robert W. Talbott	Washington, D. C	Washington Dental Society.
A. J. Thomas	Evansville, Ind	Southern Hospital for Insane.
F. B. Tiffany	Kansas City, Mo	University Medical College of Kansas City.
Wm. Tillman	La Crosse, Wis	State of Wisconsin, appointed by the governor.
Jno. W. Trader	Sedalia, Mo	State of Missouri, appointed by the governor.
J. Rufus Tryon	Washington, D. C	U. S. Navy (Surgeon-General).
Lawrence Turnbull	Philadelphia, Pa	Jefferson Medical College Hospital.
Robert Straker Turton	Jamaica, West Indies	Board of Physicians of Jamaica.
T. J. Tyner	Austin, Tex	State of Texas, by appointment by the governor.
James Tyson	Philadelphia, Pa	University of Pennsylvania.
Juan J. Ulloa	San José, Costa Rica	The Government of Costa Rica Costa Rica Medical Society.
J. N. Upshur	Richmond, Va	The Commonwealth of Virginia, by appointment by the governor.
B. A. Vaughan	Columbus, Miss	Mississippi State Medical Association.
Joshua M. Van Cott, jr	Brooklyn, N. Y	Long Island College Hospital.
William K. Vance	Bristol, Tenn	Bristol Medical Society.
Albert Vander Veer	Albany, N. Y	Albany Medical College.
Geo. Tully Vaughan	Washington, D. C	U. S. Marine-Hospital Service.
Victor C. Vaughan	Ann Arbor, Mich	University of Michigan, State of Michigan, by appointment by the governor.
Thomas Norris Vincent	Washington, D. C	Medical Association of District of Columbia.
J. Roland Walton	Washington, D. C	Dental Department National University.
Arthur Williams	Elk Ridge, Md	Medical Association of Howard County, Md.
Jefferson H. Wilson	Beaver, Pa	Beaver County Medical Society.
John Collins Warren	Boston, Mass	Medical School of Harvard University.
Irving A. Watson	Concord, N. H	The American Public Health Association.
Louis A. Weigel	Rochester, N. Y	Orthopedic Association.
Ernst Wende	Buffalo, N. Y	Health Department of Buffalo.
Alexander C. Wenz	Hanover, Pa	York County (Pa.) Medical Society.
George William West	Washington, D. C	Medical Association of the District of Columbia.
Edward Graeff West	Boston, Mass	Massachusetts Medical Society.
Hamilton Atchison West	Galveston, Tex	Texas Medical State Association.
J. T. Wilson	Sherman, Tex	State of Texas, by appointment by the governor.
Jacob L. Williams	Boston, Mass	Massachusetts Medical Society.
Robert J. Wilding	Malone, N. Y	Northern New York Medical Association.
James C. Wilcox	Darlington, S. C	South Carolina State Medical Association.
William J. Williams	Adel, Iowa	Dallas County (Iowa) Medical Association.

REGISTERED DELEGATES—Continued.

Name.	Residence.	Delegate from—
John L. Wolf	Washington, D. C	Medical Department Georgetown University.
John R. Wolfe	Glasgow, Scotland	St. Mungo's College, Glasgow.
Galen Murray Woodcock	Bangor, Me	State of Maine, by appointment by the governor.
Charles E. Woodruff	U. S. Army	U. S. Army.
J. Ramon Icaza	City of Mexico	State of Sinaloa.
A. G. Young	Augusta, Me	State Board of Health of Maine.
Juan Zavala	Guadalajara, Mexico	The State of Jalisco.
E. Gustav Zuike	Cincinnati, Ohio	Medical College of Ohio.
Bernard Zweighoft	Philadelphia, Pa	University of Pennsylvania.

REGISTERED MEMBERS.

Name.	Residence.
Aguilar, F	San José, 2, Cadiz, Spain.
Acker, George N	913 Sixteenth street NW., Washington, D. C.
Adams, Samuel S	1632 K street NW., Washington, D. C.
Adams, William A	Fort Worth, Tex.
Adams, Zabdiel Boylston	Framingham, Mass.
Arnold, J. Dennis	54 Chronicle Building, San Francisco, Cal.
Alden, Charles H., A. S. G	Surgeon-General's Office, Washington, D. C.
Allen, Dudley P	278 Prospect street, Cleveland, Ohio.
Allen, Rufus L	Waynesville, N. C.
Almy, Leonard Ballow	Norwich, Conn.
Als, Adolph	3819 Pine street, St. Louis, Mo.
Anderson, L. B	Norfolk, Va.
Anderson, Frank	1628 Nineteenth street NW., Washington, D. C.
Anderson, Albert	1311 H street NW., Washington, D. C.
Anderson, Joseph W	Ardmore, Pa.
Ames, H. E	3026 P street NW., Washington, D. C.
Anders, J. M	Philadelphia, Pa. (Medico-Chirurgical College).
Arwin, John S	Columbus, Ind.
Ash, William M	473 Florida avenue NW., Washington, D. C.
Ashton, Lawrence	Dallas, Tex.
Atkinson, W. B	1400 Pine street, Philadelphia.
Atkinson, I. E	605 Cathedral street, Baltimore, Md.
Austin, H. W	Marine-Hospital Service, Washington, D. C.
Ayers, Edw. A	151 East Thirty-fourth street, New York City.
Arango, G. Y	Santander, Colombia.
Bennett, T. J	Austin, Tex.
Boldt, Hermann	51 West Fifty-second street, New York City, N. Y.
Bond, Erwin D	Parkersburg, W. Va.
Borden, Henry F	Brockton, Mass.
Bowen, W. Sinclair	1531 I street NW., Washington, D. C.
Boyd, James P	Albany, N. Y.
Boyd, John C	1313 P street NW., Washington, D. C.
Boyle, C. B	1615 S street NW., Washington, D. C.
Braunwarth, A. M	Post-Graduate School Hospital, Chicago, Ill.
Briggs, A. B	Ashaway, R. I.
Briscoe, W. C	317 C street NW., Washington, D. C.
Brock, C. W. P	Richmond, Va.
Bromwell, J. R	1147 Connecticut avenue, Washington, D. C.
Brose, L. D	Evansville, Ind.
Brothers, A	162 Madison street, New York City, N. Y.
Brower, Daniel R	Chicago, Ill.
Brown, Bedford	Alexandria, Va.
Brown, Hawkins	Hustonville, Ky.
Brown, Price	Toronto, Ontario, Canada.
Brown, S. B	Fort Wayne, Ind.
Browne, Valentine	Yonkers, N. Y.
Brubaker, A. P	Jefferson Medical College, Philadelphia, Pa.
Brush, E. F	Mount Vernon, N. Y.
Brumbaugh, G. Marcus	904 Massachusetts avenue, Washington, D. C.
Bogan, Samuel W	421 G street NW., Washington, D. C.
Bryan, J. H	818 Seventeenth street NW., Washington, D. C.
Bryce	Toronto, Ontario, Canada.
Buchanan, C. M	1212 Twelfth street NW., Washington, D. C.
Baggett, John B	1920 Sixteenth street NW., Washington, D. C.
Baldy, J. M	1722 Chestnut street, Philadelphia, Pa
Baker, William H	22 Mount Vernon street, Boston, Mass.
Ball, O. D	Albany, N. Y.
Baker, Frank	1315 Corcoran street, Washington, D. C.
Baker, Henry B	726 Ottowa street, Lansing, Mich.
Baker, A. R	122 Euclid avenue, Cleveland, Ohio.
Barker, H. H	1116 H street NW., Washington, D. C.

REGISTERED MEMBERS—Continued.

Name.	Residence.
Barton, S. S	1523 Spruce street, Philadelphia, Pa.
Baruch, Simon	51 West Seventieth street, New York City, N. Y.
Baskett, John N	Hannibal, Mo.
Bates, N. L	U. S. Navy.
Beck, Carl	37 East Thirty-first street, New York City, N. Y.
Bell, A. Nelson	Brooklyn, N. Y.
Belt, E. O	1701 H street NW., Washington, D. C.
Bentley, E	Little Rock, Ark.
Bergin, Darby	Surgeon-General of Canada, Ontario, Canada.
Bemays, A. C	St. Louis, Mo.
Bey, Grant	Palais Matatin, Cairo, Egypt.
Beyer, Henry G	Annapolis, Md.
Bill, T. J	Tyler, Tex.
Billings, John S	Army Medical Museum, Washington, D. C.
Bishop, S. S	Chicago, Ill.
Blackader	236 Mountain street, Montreal, Canada.
Bleyer, J. M	118 East Sixteenth street, New York City, N. Y.
Boarman, C. W	1104 Maryland avenue SW., Washington, D. C.
Bodkin, D. G	290 Clinton avenue, Brooklyn, N. Y.
Boise, Eugene	Grand Rapids, Kent County, Mich.
Bryant, Jos. D	54 West Thirty-first street, New York City, N. Y.
Burch, J. D	Aurora, Tex.
Burnett, Swan M	1770 Massachusetts avenue NW., Washington, D. C.
Bierd, Daniel S	Binghampton, N. Y.
Burroughs, John I	Houston, Tex.
Burroughs, Silas M	82 Fulton street, New York City, N. Y.
Busey, Samuel C	901 Sixteenth street NW., Washington, D. C.
Byers, J. W	Charlotte, N. C.
Campbell, J	34 Congress street, Hartford, Conn.
Cattell, H. W	3455 Woodland avenue, Philadelphia, Pa.
Collins, Orville W	South Framingham, Mass.
Cannaday, Charles G	Roanoke City, Va.
Cahart, John W	Lampasas, Tex.
Carmona y Valle	Eucarnaceon, 8, Mexico City, Mexico.
Carvello, H. D. W	Manchester, N. H.
Carr, William	35 West Forty-sixth street, New York City, N. Y.
Clairac, Dr. José	O'Reilly, 25, Habana, Cuba.
Corneau, Auguste	Port au Prince, Hayti.
Carstens, J. Henry	Detroit, Mich.
Carter, William S	807 North Forty-first street, Philadelphia, Pa.
Carter, H. R	U. S. Marine-Hospital Service, Washington, D. C.
Cartwright, Silas S	Roxbury, Delaware County, N. Y.
Castellanos, John J	72 Orleans street, New Orleans.
Cerna, David	Galveston, Tex.
Chamberlin, Frank T	226 New Jersey avenue SE., Washington, D. C.
Collins, James	704 Franklin street, Philadelphia, Pa.
Chestnut, J. H. W	1757 Frankford avenue, Philadelphia, Pa.
Chittenden, Russell H	New Haven, Conn.
Claiborne, John Herbert	Petersburg, Va.
Clarke, A. P	Cambridge, Mass.
Clauser, N. D	Hartford City, Ind.
Cobb, Frederic	102 Charles street, Boston, Mass.
Cobb, William H. H	479, Goldboro, N. C.
Coe, Anton	Washington, D. C.
Cohen, S. S	219 South Seventeenth street, Philadelphia, Pa.
Cohen, Felix	38 East Sixtieth street, New York City, N.Y.
Coit, Henry L	Newark, N. J.
Cole, G. R. Lee	424 Seventh street, Washington, D. C.
Coleman, P. C	Colorado, Tex.
Collings, Samuel P	Hot Springs, Ark.
Collins, Charles Read	1125 Fourteenth street, Washington, D. C.
Comegys, Cornelius G	Cincinnati, Ohio.
Compton, William Penn	1732 K street, Washington, D. C.
Conn, G. P	Concord, N. H.

REGISTERED MEMBERS—Continued.

Name.	Residence.
Conner, Phineas S	159 Ninth street, Cincinnati, Ohio.
Contreras, Angel	Calle de J. C. Bonilla, No. 4, Puebla, Mexico.
Cook, G. W	3 Thomas Circle, Washington, D. C.
Corr, A. C	Carlinville, Macoupin County, Ill.
Corson, Jos. K	Washington barracks, D. C.
Criley, Benton H	Dallas Center, Iowa.
Cronyn, John	Buffalo, N. Y.
Crothers, Thomas D	Hartford, Conn.
Croasdale, H. T	1525 Walnut street, Philadelphia, Pa.
Culbertson, J. C	Cincinnati, Ohio.
Cunningham, Thomas E	707 Main, cor. Clinton street, Cambridge, Mass.
Curtis, H. Holbrook	New York City, N. Y.
Curtis, Frederic Colton	17 Washington avenue, Albany, N. Y.
Curtin, Roland G	Philadelphia, Pa.
Currier, Andrew F	159 East Thirty-seventh street, New York City, N. Y.
Cushing, Ernest W	168 Newbury street, Boston, Mass.
Cuthbert, W. F	1462 Rhode Island avenue, Washington, D. C.
Cutler, William E	Chelsea, Mass.
Campo, Juan Martinez del	Alcaicerea 15, City of Mexico.
Connell, A. J	433 Lackawanna avenue, Scranton, Pa.
Carbee, Samuel Powers	Haverhill, N. H.
Chisolm, Julian J	114 West Franklin street, Baltimore, Md.
Dabney, William C	University Station, Va.
Daland, Judson	319 South Eighteenth street, Philadelphia, Pa.
Davis, James C	Rochester, N. Y.
Davis, Samuel T. D	Lancaster, Pa.
Darby, J. I	Americus, Ga.
Daly, John S	520 Thirteenth street NW., Washington, D. C.
Dawson, Wm. J. G	St. Helena, Napa County, Cal.
Day, Mary C. G	25 J block, Wichita, Kans.
de Roaldes, A. W	136 Grovier street, New Orleans, La.
Dougall, William	507 Union street, Joliet, Ill.
Douglas, George	Oxford, Chenany & Co., New York, N. Y.
Donnally, William	1022 Fourteenth street, Washington, D. C.
Donohue, Florence	1134 Eighth street NW., Washington, D. C.
Drew, C	Jacksonville, Fla.
Driscoll, W. E	525 East Main street, Muncie, Ind.
Ducum, Francis X	810 Broad street, Philadelphia, Pa.
Dufour, Clarence R	1009 H street, Washington, D. C.
Duhring, Louis A	Philadelphia, Pa.
Dye, Hobart S	1403 L street NW., Washington, D. C.
Dean, G. E	Scranton, Pa.
Delavan, Prof. D. B	1 East Thirty-third street, New York City, N. Y.
Desaussure, R. G	62 Hasell street, Charleston, S. C.
de Schweinitz, E. A	Cosmos Club, Washington, D. C.
Dewees, William B	Salina, Saline County, Kans.
de Yta, Jose M	Pueblo, Mexico.
Duenās, Joaquin	San Miguel 75, Habana, Cuba.
Dixon, H. T	704 Fulton avenue, Evansville, Ind.
Doubleday, Chas. E	Penn Yan, Yates County, N. Y.
Dumeswil, A. H. O	1 North Broadway, St. Louis, Mo.
Davis, Josephine Griffith	132 West Twelfth street, New York City.
Duffy, Charles	Newbern, N. C.
Dolan, Wm. K	Scranton, Pa.
Earley, Charles R	Ridgway Pa.
Edson, Cyrus	9 W. Forty-ninth street, New York, N. Y.
Early, Thomas B	1228 Fairmount avenue, Philadelphia, Pa.
Edebohls, George M	198 Second avenue, New York, N. Y.
Eddy, W. J	Shelbyville, Ill.
Edwards, Landon B	Richmond, Va.
Eliot, Llewellyn	1106 P street, Washington, D. C.
Eliot, Johnson	1417 N street, Washington, D. C.
Elliott, William H	Savannah, Ga.
Ernst, Harold C	Boston, Mass.

REGISTERED MEMBERS—Continued.

Name.	Residence.
Evans, George	133 W. Thirty-fourth street, New York, N. Y.
Evans, Warwick	1105 Ninth street, Washington, D. C.
Eyler, Charles H	Belize, British Honduras.
Elmer, Henry W	Bridgeton, N. J.
Engleman, George J	St. Louis, Mo.
Farnham, Robt	1103 M street, Washington, D. C.
Fell, Geo. E	72 Niagara street, Buffalo, N. Y.
Fenwick, Jos. B	181 Chestnut street, Chelsea, Mass.
Finley, M. F	1928 I street, Washington, D. C.
Finn, C. G	Hempstead, N. Y.
Finney, Frank	La Junta, Colo.
Fiske, Sam'l A	37 Eighteenth avenue, Denver, Colo.
Fitz, Reginald H	18 Arlington street, Boston, Mass.
Fitzpatrick, T. V	136 W. Eighth street, Cincinnati, Ohio.
Flanders, Chas. F	Manchester, N. H.
Flich, Lawrence F	736 Pine street, Philadelphia, Pa.
Fletcher, M. H	65 W. Seventh street, Cincinnati, Ohio.
Ford, De Saussure	Augusta, Ga.
Formento, Felix	New Orleans, La.
Forster, Otto E	1515 Washington avenue, St. Louis, Mo.
Forward, J. L	Chester, Pa.
Forward, Wm. H	U. S. Soldiers' Home, Washington, D. C.
Foster, R. A	2029 Q street, Washington, D. C.
Frank, Jacob	17 Lincoln avenue, Chicago, Ill.
Frankhauser, F. W	Reading, Pa.
Franzoni, Chas. W	605 I street, Washington, D. C.
Frazier, Wm. A	Staunton, Va.
Fry, Wm. H	1826 Jefferson Place, Washington, D. C.
Fuller, Wm	Grand Rapids, Mich.
Frey, C. L	Scranton, Pa.
Fullerton, Erskine B	Columbus, Ohio.
Foster, W. S	133 Wylie avenue, Pittsburg, Pa.
Greenley, Thomas B	Meadow Lawn, Jefferson County, Ky.
Grinder, Geo. W	923 Ninth street, NW., Washington, D. C.
Guiteras, Daniel M	Hotel Richmond, Washington, D. C.
Gable, I. C	York, Pa.
Gad, Prof. J	Berlin S. W., Grossbeerenstr 67.
Greene, C. T	Castile, Wyoming County, N. Y.
Gorgas, A. C	Museum of Hygiene, Washington, D. C.
Gurlich, S. M	316 State street, Fairfield County, Conn.
Guiteras, Ramon	79 West Fifty-fourth street, New York City, N. Y.
Garcelon, Alonzo	Lewiston, Me.
Garcia, Eduardo R	13 San Jose de Garcia, Mexico City.
Garde, La Louis A	U. S. A. Hospital, Jackson Park, Chicago, Ill.
Gardner, Joseph	Bedford, Ind.
Garrigues, Henry J	155 Lexington avenue, New York City, N. Y.
Gardner, William	109 Union avenue, Montreal, Canada.
Gaviño, Angel	Corbatana, 6, Mexico City, Mexico.
Garciadiego, S	Guadalajara, Santuario 8, Mexico.
Garces, A	Popayan, Rep. of Colombia, del Cauca Colombia Republic.
Gilles, V. L	Port au Prince, Haiti.
Gibbons, Richard H	435 Wyoming avenue, Scranton, Pa.
Gihon, A. L	U. S. Navy.
Goss, Ossian W	Laconia, N. H.
Goss, I. H	Athens, Clarke County, Ga.
Gotthiel, William S	25 W. Fifty-third street, New York City, N. Y.
Gould, George M	Philadelphia, Pa.
Graham, D. W	672 W. Monroe street, Chicago, Ill.
Graves, Amos	San Antonio, Tex.
Greene, T. C	Chicago, Ill.
Greenleaf, R. W	561 Boylston street, Boston, Mass.
Gundry, R. F	Catonsville, Baltimore County, Md.
Gunnell, R. H	1727 Q street, Washington, D. C.

REGISTERED MEMBERS—Continued.

Name.	Residence.
Gutierrez, Manuel	Mexico City, 2ª Aduana Vieja 12, Mexico.
Gillmer, Maurice W	1618 S. Broad street, Philadelphia, Pa.
Heiberger, Ida J	722 Eighteenth street, Washington, D. C.
Henderson, G	817 T street, Washington, D. C.
Herbert, J Fred'k	1313 Arch street, Philadelphia, Pa.
Herff, F	San Antonio, Tex.
Hernandez, Juan	San Juan, Porto Rico.
Hibberd, J. F	Indiana.
Hill, E. A	East Killingly, Conn.
Hobbs, A. G	Atlanta, Ga.
Hobby, C. M	Iowa City, Iowa.
Hodge, C. F	Worcester, Mass.
Hoff, J. Van R., U. S. A	Governors Island, N. Y.
Hoffman, R. C	Oskaloosa, Iowa.
Hogue, W. P	Charleston, W. Va.
Holden, R. J	802 Sixth street, Washington, D. C.
Holmes, B	104 East Fortieth street, Chicago, Ill.
Holmes, J. B. S	Rome, Ga.
Holton, H. D	Brattleboro, Vt.
Homan, G	St. Louis, Mo.
Hoover, T. C	Columbus, Ohio.
Hopkins, J. G	Thomasville, Ga.
Howitt, H	Guelph, Ontario, Canada.
Hubbell, A. A	Buffalo, N. Y.
Hughes, C. H	St. Louis, Mo.
Hummel, A. L	Philadelphia, Pa.
Huntington, D. L., U. S. A	Surgeon-General's Office, Washington, D. C.
Hutchinson, W. F	Providence, R. I.
Hyatt, F	1228 Seventeenth street, Washington, D. C.
Heffron, Jno. L	Syracuse, N. Y.
Holmes, Christian R	Cincinnati, Ohio.
Harvie, Lewis E	Danville, Va.
Hansell, Howard F	254 S. Sixteenth street, Philadelphia, Pa.
Hunt, Joseph H	1085 Bedford avenue, Brooklyn, N. Y.
Hamilton, Jno. B	Room 20, Post-office building, Chicago, Ill.
Hamilton, Hugh	212 Second street, Harrisburg, Pa.
Hamlin, Chas. W	Middleville, Herkimer County, N. Y.
Hammer, Robt. B	Greensburg, Pa.
Hammond, W. A	Thirteenth and Princeton street, Washington, D. C.
Handy, W. E	300 A street SE., Washington, D. C.
Hare, H. A	222 S. Fifteenth street, Philadelphia, Pa.
Harris, Philander A	Paterson, N. J.
Harrison, Geo. Byrd	605 Fourteenth street NW., Washington, D. C.
Hart, Ernest	Donegal Castle, London, England.
Hart, Mrs. Ernest	Do.
Hatch, Jas. H	1011 Pine street, San Francisco, Cal.
Hayes, Henry L	Cor. First and B streets NE., Washington, D. C.
Haynes, Irving P	316 E. Eighty-sixth street, New York, N. Y.
Haywood, Edmund B	Raleigh, N. C.
Hazan, D. H	407 Sixth street SW., Washington, D. C.
Haehnlen, W. Frank	1421 N. Broad street, Philadelphia, Pa.
Hughes, W. E	3726 Baring street, Philadelphia, Pa.
Hammond, Græme Monroe	58 W. Forty-fifth street, New York, N. Y.
Hulohizer, Allen H	Pennsylvania.
Ill, Edward J	Newark, N. J.
Ingalls, E. Fletcher	36 Washington street, Chicago, Ill.
Inglis, David	Detroit, Mich.
Irwin, R. J. D	U. S. Army, Chicago, Ill.
Jackson, Edward	215 S. Seventeenth street, Philadelphia, Pa.
Jackson, Jabez N	Kansas City, Mo.
Johnson, H. L. E	1400 L street NW., Washington, D. C.
Jenkins, William T	Health Office, New York, N. Y.
Johnson, Robert W	101 W. Franklin street, Baltimore, Md.
Jover, Antonio	University of Havana, Havana, Cuba.

REGISTERED MEMBERS—Continued.

Name.	Residence.
Johnson, Walter B	Paterson, N. J.
Johnson, Joseph Tabor	1728 K street NW., Washington, D. C.
Jacobs, W. C	Akron, Ohio.
Jacobi, A	New York.
Kemp, Dean G	Montpelier, Vt.
Kelly, Elijah S	Minneapolis, Minn.
Kelly, George M	Washington, Pa.
Kemp, George T	Johns Hopkins University, Baltimore, Md.
Keyser, Peter D	Philadelphia, Pa.
Kingsbury, Albert D	Needham, Mass.
Kollock, Charles W	Charleston, S. C.
Kent, Richard W	Eureka Mills, Cal.
Ketchum, George A	7 N. Conception, Mobile, Ala.
King, James K	Watkins, N. Y.
King, A. F. A	1315 Massachusetts avenue, Washington, D. C.
Kirwan, George H	Wilkes Barre, Pa.
Klienschmidt, C. H. A	3045 N street, Washington, D. C.
Klinedinst, J. Ferd	York, Pa.
Knapp, J. Rollo	New Orleans, La.
Knox, William F	McKeesport, Pa.
Koser, Simon S	Williamsport, Pa.
Lagleyze, Pedro	Buenos Ayres, Argentine Republic.
Lopez, Enrique	Apartado, 273, Havana, Cuba.
Laine, Damaso	Media, Pa.
Lamb, Daniel S	Army Medical Museum, Washington, D. C.
Lancaster, F. M	Wayside, Md.
Laplace, Ernest	Philadelphia, Pa.
Larrabee, Jno. A	Louisville, Ky.
Latham, Henry W	Latham, Mo.
Lautenbach, Louis J	1723 Wayland street, Philadelphia, Pa.
Latimer, Thos. S	103 W. Monument street, Baltimore, Md.
Lavista, Rafael	1ª de Independencia, Mexico City, Mex.
Lawler, William P	60 Andover street, Lowell, Mass.
Lee, Benj	Care Executive Mansion, Harrisburg, Pa.
Leech, D. Olin	631 Maryland avenue NE., Washington, D. C.
Leech, Frank	Children's Hospital, Washington, D. C.
Lehlbach, Chas., jr	Newark, N. J.
Leighton, Nathaniel W	143 Taylor street, Brooklyn, N. Y.
Lewis, Eugene R	Kansas City, Mo.
Liceaga, E	San Andres 4, Mexico City, Mexico.
Lincoln, Nathan S	1514 H street N. W., Washington, D. C.
Love, J. W. C	Mexico City, Mexico.
Lowe, Geo. N	Randall, Kans.
Lowman, John H	441 Prospect street, Cleveland, Ohio.
Lindsley, Chas. A	New Haven, Conn.
Loboi, David	Professor of physiology, University of Caracas, Caracas, Venezuela.
Logan, Jas. E	Kansas City, Mo.
Love, Louis F	Philadelphia, Pa.
Love, I. N	St. Louis, Mo.
Lucas, V. C	1101 Pearl street, Cleveland, Ohio.
Lewis, R. H	Raleigh, N. C.
Lovell, Chas. E	Whitman, Mass.
Loring, Francis B	1420 K street, Washington, D. C.
Mackenzie, Jno. N	Johns Hopkins University, Baltimore, Md.
Marvel, Philip	Atlantic City, N. J.
Macallum, A. B	Toronto University, Toronto, Canada.
Macdonald, Henry	Woodhaven Junction, Long Island, N. Y.
Macdonald, Willis G	Albany, N. Y.
Mackall, Louis, jr	U. S. Army, Washington, D. C.
MacKinnon, Angus	Professor of oratario, Guelph, Canada.
Maclean, Donald	Detroit, Mich.
Macouzet, Rogue	Mexico City, Mexico.
Magruder, G. L	815 Vermont avenue NW., Washington, D. C.

REGISTERED MEMBERS—Continued.

Name.	Residence.
Mahoney, Stephen A	Holyoke, Mass.
Manley, Thos. W	302 W. Fifty-third street, New York, N. Y.
Miranda, Ramon L	349 W. Forty-sixth street, New York, N. Y.
Y'Marti, Tomas Casas	Havana, Cuba.
Marcy, Henry O	180 Commonwealth street, Boston, Mass.
Marmion, W. V	Washington, D. C.
Marin, Francisco	Infantes 11, Puebla, Mexico.
Martin, Hugh	Prince Edward Island, Canada.
Mayer, Oscar J	SW. corner Gary and Octavia Streets, San Francisco, Cal.
Massey, G. Betton	212 S. Fifteenth street, Philadelphia, Pa.
Matas, Rudolph	72 S. Rampart street, New Orleans, La.
Mathiot, Edward B	Westinghouse Building, Pittsburg, Pa.
Mattison, J. B	Brooklyn, N. Y.
Maury, Richard B	273 Beale Street, Memphis, Tenn.
Maxcy, F. E	18 Iowa Circle, Washington, D. C.
Maxson, Willis H	St. Helena, California.
Mays, Thomas J	1829 Spruce Street, Philadelphia, Pa.
Mendizabal, G	Orizaba, San Miguel NE., Vera Cruz, Mexico.
Merrick, Samuel K	843 Eutaw street, Baltimore, Md.
Mitchell, James H	Cohoes, N. Y.
Miller, Adolph W	400 N. Third street, Philadelphia, Pa.
Miller, Abner M	Lancaster County, Bird-In-Hand, Pa.
Miller, David P	Huntingdon, Pa.
Milliken, Samuel E	36 W. Fifty-ninth street, New York, N. Y.
Miles, Franklin	1315 Masonic Temple, Chicago, Ill.
Mills, Chas. K	1909 Chestnut street, Philadelphia, Pa.
Mitchell, Giles S	Cincinnati, Ohio.
Monjaros, J. E	Cinco de Mayo 2, San Luis Potosi, Mexico.
Montgomery, E. E	1715 Walnut street, Philadelphia, Pa.
Montizambert, Frederick	Quebec, Canada.
Moran, Jno. F	2120 Pennsylvania avenue, Washington, D. C.
Morgan, Jas. Dudley	919 Fifteenth street NW., Washington, D. C.
Muñóz, Louis G	Libertad No. 7, Chihuahua, Mexico.
Muñíz, Manuel A	Lima, Peru.
Murdoch, Jas. Bissett	Pittsburg, Pa.
Mosher, Eliza M	196 Jovaleman street, Brooklyn, N. Y.
Mullen, Alex. J	Michigan City, Ind.
Mullinnix, L. P	Astoria, Oreg.
Muncaster, S. B	1510 H street NW., Washington, D. C.
Murray, T. Morris	730 Seventeenth street NW., Washington, D. C.
Musser, J. H	406 Locust street, Philadelphia, Pa.
Montgomery, Edmund B	Quincy, Ills.
Morse, Fred. Harris	Melrose, Mass.
Morris, Robert T	133 W. Thirty-fourth st., New York, N. Y.
Murray, Robert A	235 W. Twenty-third street, New York, N. Y.
Muncaster, Magruder	1510 H street NW., Washington, D. C.
Mundell, John H	1022 Eighteenth street, NW., Washington, D. C.
Murphy, J. B	911 Venetian Building, Chicago, Ill.
McArdle, Thomas E	821 Sixteenth street NW., Washington, D. C.
McCall, Hugh	Lapeer, Mich.
McCowen, Jennie	Davenport, Iowa.
McCann, Joseph D	Monticello, Ind.
McCosh, Andrew J	600 Madison avenue, New York, N. Y.
McDaniel, Edward D	Mobile, Ala.
McFarland, Joseph	1314 Franklin street, Philadelphia, Pa.
McFarland, Solomon F	Binghamton, N. Y.
McKie, T. Jefferson	Woodlawn, S. C.
McLain, John S	1924 N street NW., Washington, D. C.
McLaughlin, James W	Austin, Tex.
McLaughlin, Thomas N	1226 N street NW., Washington, D. C.
McMahon, C. Agness	Evansville, Ind.
McMurtry, Lewis S	231 Chestnut street, Philadelphia, Pa.
McRae, Floyd W	63½ Whitehall street, Atlanta, Ga.

REGISTERED MEMBERS—Continued.

Name.	Residence.
McShane, James F	City Hall, Baltimore, Md.
McComas, Josiah Lee	Oakland, Md.
Noble, Chas. P	Philadelphia, Pa.
Nash, Francis S	909 Sixteenth street NW., Washington, D. C.
Neff, John	701 Carrollton avenue, Baltimore, Md.
Nelson, Wolfred D. E	Astor House, New York, N. Y.
Noble, Henry Bliss	1324 New York avenue, Washington, D. C.
Noriega, Tomas	Hospital de Jesus, Mexico City, Mexico.
Norris, Albert Lane	Cambridge, Mass.
Norris, Milton D	Catonsville, Md.
Nagle, John T	Health department, New York City, N. Y.
Northrop, Geo. J	Marquette, Mich.
Novy, Frederick G	University of Michigan, Ann Arbor, Mich.
Nelson, Hugh T	Charlottesville, Va.
Ober, Geo. C	210 B street SE., Washington, D. C.
Ortiz, Rafael	San Miguel No. 236, Havana, Cuba.
Osio, M. T	Fuen Corrall 57, Madrid, Spain.
Oenslager, John, jr	Harrisburg, Pa.
O'Daniel, William	Atlanta, Ga.
Orvaños, Domingo	Chavarria 25, Mexico City, Mexico.
Otl, Isaac	Easton, Pa.
Opie, Thomas	219 W. Monument street, Baltimore, Md.
Osler, William	Johns Hopkins University, Baltimore, Md.
Owen, Abraham M	Evansville, Ind.
Owings, Thomas B	Ellicott City, Md.
Outerbridge, Thaddeus A	Bermuda.
Portuondo, A. J	Santiago de Cuba, Cuba.
Padilla, Juan	Guatemala City, Guatemala.
Page, Chas	U. S. Army, Governors Island, N. Y.
Pancoast, Wm. N	Philadelphia, Pa.
Park, J. Walter	Harrisburg, Pa.
Parker, Chas. B	564 Euclid avenue, Cleveland, Ohio.
Parsons, Mary	Washington, D. C.
Patton, Geo. F	312 Camp street, New Orleans, La.
Pepper, William	1811 Spruce street, Philadelphia, Pa.
Perry, Geo. N	1524 Fourteenth street NW., Washington, D. C.
Phillippo, James Cecil	Kingston, Jamaica.
Page, Isham R	1206 Linden avenue, Baltimore, Md.
Phinney, Lorenzo N	26 West avenue, Norwalk, Conn.
Postle, James Martin	Hinckley, Ill.
Pierson, William	13 Hillyer street, Orange, N. J.
Pilcher, L. S	145 Gates avenue, Brooklyn, N. Y.
Pitner, F. R	Fairfield, Ill.
Palmer, Lewis M	South Framingham, Mass.
Pile, Mayne M	1230 Fourteenth street NW., Washington, D. C.
Parendes, Guillermo Vargas	Bogota, Cawera 7, 638, Colombia, South America.
Plummer, Richard Henry	652 Mission street, San Francisco, Cal.
Pollitzen, Sigmund	21 W. Fifty-second street, New York, N. Y.
Polok, John Osborn	25 Seventh avenue, Brooklyn, N. Y.
Politzer, Adam	Vienna, Austria.
Porteaus, James G	Poughkeepsie, N. Y.
Powell, Thomas E	Evansville, Ind.
Prentiss, D. Webster	1101 Fourteenth street NW., Washington, D. C.
Prewitt, T. F	3101 Pine street, St. Louis, Mo.
Probst, Chas. O	Columbus, Ohio.
Quimby, Isaac N	City Hospital, Jersey City, N. J.
Rake, Beaver	Trinidad, British West Indies.
Randall, Edw	Galveston, Tex.
Ravogh, Augustus	88 W. Seventh street, Cincinnati, Ohio.
Redfield, Paul I	161 Benefit street, Providence, R. I.
Redmond, Henry	1224 Walnut street, Philadelphia, Pa.
Reed, John G	Elmwood Place, Cincinnati, Ohio.
Reed, Chas. A. L	311 Elm street, Cincinnati, Ohio.
Reeser, Howard I	Reading, Pa.

REGISTERED MEMBERS—Continued.

Name.	Residence.
Regensburger, Alfred E	San Francisco, Cal.
Reichert, Edw. T	Philadelphia, Pa.
Rauch, John H	Chicago, Ill.
Renner, Wm. S	361 Pearl street, Buffalo, N. Y.
Renshaw, Frank G	Pensacola, Fla.
Reyburn, Robt	Washington, D. C.
Remington, Jos. P	Philadelphia, Pa.
Rivero-Saldivia, H	Carácas, Venezuela.
Reyaud, L. F	24 Barome street, New Orleans, La.
Richardson, C. W	1102 L street, Washington, D. C.
Risley, S. D	1722 Walnut street, Philadelphia, Pa.
Richardson, A. B	Columbus, Ohio.
Richardson, M. H	224 Beacon street, Boston, Mass.
Roberts, J. B	1627 Walnut street, Philadelphia, Pa.
Rusby, H. H	209 E. Twenty-third street, New York, N. Y.
Rockwell, A. D	113 W. Thirty-first street, New York City, N. Y.
Roddick, Thos. G	80 Union avenue, Montreal, Canada.
Roe, John O	Rochester, N. Y.
Rohé, Geo. H	Catonsville, Md.
Roher, Geo. R	Lancaster, Pa.
Rost, Eliza H	26 Central Music Hall, Chicago, Ill.
Rost, Edw. K	Hartford, Conn.
Rotch, J. N	Boston, Mass.
Rudgles, Chas. A	Stockton, Cal.
Rubin, Luis H	1 Tacon street, Havana.
Resquez, Francisco A	Carácas, Venezuela.
Ruiz, Luis E	Calle Norte, 11 N.,316, Mexico City.
Rutherford, Jacob C	14 Franklin street, Providence, R. I.
Ryan, Frank G	3739 Brown street, Philadelphia, Pa.
Rowe, M	Laurel, Md.
Salicrup, Pedro J	129 E. Seventeenth street, New York, N. Y.
Sellman, Wm. A. B	Baltimore, Md.
Saumer, A. J. C	103 State street, Chicago, Ill.
Satterlee, Richard H	Easton, Md.
Savage, Gile C	Nashville, Tenn.
Sayre, Reginald H	285 Fifth avenue, New York, N. Y.
Schapps, John C	498 Bedford avenue, Brooklyn, N. Y.
Schavoer, F	8 Atlantic street, Stamford, Conn.
Scott, Jos. F	1311 Connecticut avenue, Washington, D. C.
Scudder, Chas. L	1 Marlboro street, Boston, Mass.
Septein, Manuel	Queretaro, Mexico.
Shakepeare, Edw. O	Rosemont station, near Philadelphia, Pa.
Sharer, John P	634 John street, Little Falls, N. Y.
Shotwell, Alfred N	Mount Clemens, Mich.
Sibbet, Robert L	Carlisle, Pa.
Sayfried, Chas. A	Newport, R. I.
Skinner, Barton D	Greenport, N. Y.
Slaughter, John Phillip	The Plain, Va.
Steman, Christian B	Fort Wayne, Ind.
Sloane, Robert T	1235 Grant avenue, Kansas City, Mo.
Small, J. Frank	135 E. Market street, York, Pa.
Smart, Chas	U. S. Army, Surgeon-General's Office.
Smith, A. R. G	North Whitefield, Me.
Smith, Arthur L	250 Bishop street, Montreal, Canada.
Smith, Allen J	Galveston, Tex.
Smith, Thos. J	Bridgeton, N. J.
Smith, Robert W. B	Seaford, Ontario.
Simon, Geo. E	Unknown.
Smith, S. McCuen	1502 Walnut street, Philadelphia, Pa.
Smith, S. Lewis	64 W. Fifty-sixth street, New York, N. Y.
Smith, Thos. C	1133 Twelfth street, Washington, D. C.
Sawyer, Jno. P	122 Euclid avenue, Cleveland, Ohio.
Snelleu, Herman, jr	The Netherlands.
Snyder, Dan'l	Scio, Ohio.

REGISTERED MEMBERS—Continued.

Name.	Residence.
Solly, Sam'l E	2 N. Cascade avenue, Colorado.
Summers, Jno. E	344 North avenue, Cambridge, Mass.
Sothoron, Elmer	1921 I street, Washington, D. C.
Sothoron, Jas. T	1917 I street, Washington, D. C.
Spackman, Mary D	1634 Sixteenth street, Washington, D. C.
Sprigg, Wm. M	911 H street, Washington. D. C.
Suddarth, Jos. L	821 N. Capitol street, Washington, D. C.
Suter, A. Walter	Herkimer, N. Y.
Summers, Geo. H	3321 N. Broad street, Philadelphia, Pa.
Sutherland, Chas	1517 Rhode Island avenue, U. S. Army.
Stamm, G	St. Paul, Minn.
Stanton, Bryon	157 Dayton street, Cincinnati, Ohio.
Stearns, H. P	Hartford, Conn.
Sternberg, Geo. M	War Department, Washington, D. C.
Stewart, Jas. A	1611 John street, Baltimore, Md.
Stevenson, Sarah H	322 N. State street, Chicago, Ill.
Stewart, David D	2620 N. Fifth street, Philadelphia, Pa.
Stiles, Chas. W	U. S. Agricultural Department, Washington, D. C.
St. John, David	Hackensack, N. J.
Stone, I. S	Washington, D. C.
Stover, Chas	Amsterdam, N. J.
Stowell, Chas	1326 New York avenue, Washington, D. C.
Stoner, Geo. W	U. S. Marine-Hospital Service.
Street, Dan'l B	1102 Ninth street, Washington, D. C.
Strout, A. O	Parkersburg, Iowa.
Smith, J. Gardner	307 Lenox avenue, New York City, N. Y.
Stevens, Geo. T	33 W. Thirty-third street, New York City.
Taft, Jonathan	Cincinnati, Ohio.
Tait, T. Oliver	18 Marietta street, Rochester, N. Y.
Talbot, Eugene S	125 State street, Chicago, Ill.
Talbot, Robt. W	1111 F street, Washington, D. C.
Taylor, Henry S	201 West Fifty-fourth street, New York, N. Y.
Teschner, Jacob	134 East Sixty-first street, New York, N. Y.
Thomas, A. J	Evansville, Ind.
Thompson, J. Ford	804 Seventeenth street, Washington, D. C.
Thompson, Jas. F	Fredericksburg, Va.
Thorner, Max	141 Garfield Place, Cincinnati, Ohio.
Thorndike, August	Boston, Mass.
Tiffany, Flavel B	College of Kansas City, Mo.
Tillman, Wm	La Crosse, Wis.
Tompkins, Edmund Lee	Washington, D. C.
Tracy, Edw. A	Boston, Mass.
Trader, John W	Sedalia, Mo.
Travis, Wm. A	Covington, Ga.
Tryon, J. R	Surgeon-General, U. S. Navy.
Turnbull, Lawrence	1719 Chestnut street, Philadelphia, Pa.
Turton, Robt. S	Browntown P. O., Jamaica, West Indies.
Tuttle, Albert Henry	735 Main street, Cambridge, Mass.
Tyner, T. J	Austin, Tex.
Tyson, James	1506 Spruce street, Philadelphia, Pa.
Upshaw, J. N	206 East Grace street, Richmond, Va.
Ulloa, Juan	San Jose, Costa Rica.
Valentine, Ferd. C	1244 Broadway, New York, N. Y.
Valk, Francis	163 East Thirty-seventh street, New York, N. Y.
Van Cott, Joshua M	122 Joralemon street, Brooklyn, N. Y.
Vance, Wm. K	Bristol, Tenn.
Vander Veer, Albert	Albany, N. Y.
Van Rensselaer, John	1023 Connecticut avenue, Washington, D. C.
Vaughan, B. A	Mississippi.
Vaughan, Geo. Tully	U. S. Marine-Hospital Service, District of Columbia.
Vaughan, Victor, C	University of Michigan, Ann Arbor, Mich.
Verdin, Wm. W	Lapidum, Md.
Vincent, T. N	1221 N street, Washington, D. C.
Wade, J. Percy	Catonsville, Md.

REGISTERED MEMBERS--Continued.

Name.	Residence.
Wallace, James	121 North Sixteenth street, Philadelphia, Pa.
Walton, J. Roland	700 Tenth street, Washington, D. C.
Williams, Aurthur	Elk Ridge, Md.
Wilson, Jefferson H	Beaver, Pa.
Weld, Geo. W	New York, N. Y.
Warren, John C	58 Beacon street, Boston, Mass.
Watson, Irving A	Concord, N. H.
Weidman, W. Murray	Reading, Pa.
Weigel, Louis A	Rochester, N. Y.
Welch, Wm. H	Baltimore, Md.
Welch, Wm. M	821 North Broad street, Philadelphia, Pa.
Wellington, J. R	1459 Fourteenth street, Washington, D. C.
Wells, Brooks H	71 West Forty-fifth street, New York, N. Y.
Wende, Ernest	471 Delaware avenue, Buffalo, N. Y.
Wentz, Alexander C	Hanover, Pa.
West, Geo. Wm	1102 Fourteenth street, Washington, D. C.
West, Edw. Graeff	630 Warren street, Boston, Mass.
West, Hamilton A	Galveston, Tex.
Wilson, J. T	Sherman, Tex.
Williams, Jacob Lafayette	1 Mount Vernon street, Boston, Mass.
Wilding, Robt. J	Malone, N. Y.
Wilcox, Jas. C	Darlington C. H., S. C.
Williams, William J	Adel, Iowa.
Wolfe, John L	1313 New York avenue, Washington, D. C.
Wolfe, John R	Glascow, Scotland.
Wood, Albert	67 Pleasant street, Worcester, Mass.
Wood, Casey Albert	103 East Adam street, Chicago, Ill.
Woodcock, Galen Murray	5 Adam street, Bangor, Me.
Woodruff, Chas. E	Assistant Surgeon, U. S. Army.
Woodward, Wm. C	125 New York avenue, Washington, D. C.
Worrell, J. W	Brownsville, Pa.
Wilson, Jas. C	1437 Walnut street, Philadelphia, Pa.
Woods, Hiram	816 Park avenue, Baltimore, Md.
Wilson, W. Reynolds	1633 Locust street, Philadelphia, Pa.
Watkins, Robt. L	320 West One hundred and forty-fifth street, New York, N. Y.
Ybarra, A. M. F	194 West Tenth street, New York, N. Y.
Yeaza, J. Ramon	City of Mexico.
Young, A. G	Augusta, Me.
Young, Henry Byrd	Burlington, N. Y.
Zavola, Juan	Guadalajara, Mexico.
Zinke, E. Gustav	85 Garfield Place, Cincinnati, Ohio.
Zweighaft, Bernard	Philadelphia, Pa.
Ziegler, S. Lewis	1504 Walnut street, Philadelphia, Pa.

PROCEEDINGS OF THE GENERAL SESSIONS.

ADDRESS BY DR. FRANCISCO A. RÍSQUEZ, OF VENEZUELA.
ADDRESS BY THE PRESIDENT OF THE CONGRESS, DR. WILLIAM PEPPER, OF PHILADELPHIA.

REPORT OF THE INTERNATIONAL EXECUTIVE COMMITTEE.

Resolved, That the International Executive Committee, on the behalf of the Pan-American Medical Congress, disclaims responsibility for the views expressed by any individual contributor to its proceedings. *Proceedings of the International Executive Committee, Washington, D. C., September 7, 1893.*

FIRST GENERAL SESSION.

SEPTEMBER 5, 1893.

Dr. WILLIAM PEPPER: The Right Rev. William Paret, D. D., Bishop of Maryland, will invoke the blessing of Almighty God upon the proceedings of this Congress.

The Right Rev. WILLIAM PARET, D. D. Let us pray.

Our Father who art in heaven, hallowed be Thy name. Thy kingdom come on earth as it is in heaven. Give us this day our daily bread, and forgive us our trespasses as we forgive those who trespass against us; and lead us not into temptation, but deliver us from evil: For Thine is the kingdom, the power, and the glory, forever and ever. Amen.

Almighty Father, by whose will and wisdom it is that medicines have power to heal and men have the will and skill to use them, who madest the bodies of men and gave to their minds the wonderful power to know and teach, bless, we beseech Thee, the medical learning and usefulness, and guide the consultations of those who are assembled to the glory of Thy name and the highest blessing of mankind. Lead them, we pray Thee, and make their lives and labors rich with fruitfulness and blessing. We ask for Jesus Christ's sake.

Direct us, O Lord, in all our dealings with Thy most gracious favor, and in all work begun and continued in Thee we may glorify Thy name and finally attain everlasting life through the grace of our Lord.

The grace of our Lord and the fellowship of the Holy Ghost be with us for ever more. Amen.

Dr. PEPPER. It is in accordance with the deep interest taken by the Government of the United States in the organization and success of this Congress that the honored President of the United States has kindly come this morning to exercise his function to open formally the First Pan-American Medical Congress. I have the great honor——.

President CLEVELAND. The part assigned me on this occasion admits of but few words. It, however, affords me the opportunity to say how pleased I am to be in any way related to such an assembly as this, altogether in furtherance of the highest and noblest purposes and designs. I hope I may also be permitted to add that the protection of the public health and the prevention of contagious diseases is properly discussed at the capital of a nation which appreciates as fully as ours the importance of all and everything which adds to make intercourse

between civilized countries and commerce between them safe and easy. It is also fitting that those gentlemen, devoting themselves to saving human life and the alleviation of human suffering, should consider the means of reaching these beneficent ends at the seat of a Government whose greatest regard is the welfare and happiness of the individual citizen.

It only remains for me to declare this Congress of the Pan-American Medical Society open for the transaction of the business which has called it together.

Dr. ADAMS. Ladies and gentlemen: It is but fitting to state that on behalf of the citizens of Washington and the committee of arrangements of the Pan-American Congress we should select one of the most distinguished of our citizens to deliver the address of welcome. Therefore, it affords me much pleasure to introduce to you the Hon. John W. Ross, LL. D., president of the Board of Commissioners of the District of Columbia.

Hon. JOHN W. ROSS. The District of Columbia has entertained many distinguished gatherings, but it has never known such a one as I now have the honor, in the name of the local municipality, to welcome to the national capital. For the first time in the history of the New World there are assembled at one of its capitals the representatives of one of the largest and most honored of the learned professions of all the Americas. It is fitting that in the District of Columbia, which derived its name from that great discoverer, and that in the year set apart as the one in which the nations of the earth may do honor to his memory, that the Governments whose existence was made possible by his genius and daring could send their representatives to the Pan-American convention. It is in keeping also with the spirit of the age, which has prompted this gathering of representative men, that the delegates so convened should meet, not for individual or for national aggrandizement, but for the loftier purpose of extending the range of medical knowledge and for the alleviation of human suffering throughout the world. To a profession as progressive as that of medicine and surgery the results of such a conference can not be overestimated.

When we consider the vast area of surface of the globe here represented, its infinite variety of racial characteristics, of climatic conditions, and of all environments affecting health and disease, we can understand that such interchange of experience and observation was never before made possible. What may not be accomplished by the forceful men from all the Governments here represented, their plans for the enforcement of national quarantine relations, for international cooperation against the spread of infectious and contagious diseases? The municipal authorities of many of the cities of the United States are to-day vainly endeavoring to locate hospitals for the treatment of contagious diseases near enough to the centers of population to avoid the dangers incident to a long transportation of persons suffering from

such diseases, and near enough to be within range of the sewer system and of an adequate water supply. It has been the common experience of all who are charged with such responsibility that the dread occasioned to those who reside in the vicinity of such proposed locations has assumed almost the proportions of a panic. If the positions maintained by many of our most eminent physicians be correct, that such hospitals when properly built and properly conducted are not likely to communicate disease to those residing near them, then the public mind should be relieved of this needless apprehension, and I venture to suggest that if this great body of experts should deem that subject worthy of its consideration there can be no doubt that the authority of the expression of its voice can do more than can be expected from any other source to educate the public mind upon this subject.

May there be, as a result of your deliberations upon all the important topics submitted to you for consideration, not only the formation and renewal of personal friendship, but a wider knowledge and a higher appreciation and a just conception of the demands of the age upon your profession. And I can not but believe that this extraordinary spectacle, this assembly of eminent physicians from all the great powers of the Western Hemisphere has a deeper significance than even the laudable one of the extension of medical knowledge among its students. Does it not indicate that benevolence and philanthropy are no longer limited by national boundaries, but that they are becoming as broad and universal as humanity itself? There will never be a time when there will be no clash of interests among the nations; but when the poor of Ireland were suffering for bread, when Chicago was desolated by fire, when Charleston and Johnstown were helpless, when the peasantry of Russia were starving, the West came in the form of material aid, ignored the terror of the seas and the boundaries of States, remembering that the stricken and suffering belong to the same great human family. New, swift means of communication are bringing the nations into closer relationship. May we not be encouraged to hope that this Pan-American Medical Convention is a forerunner of successive courses of all civilized states, whereby all the common interests of the states may be fostered and maintained. Mr. President and gentlemen, when you have as your immediate hosts all the immediate members of our profession who are our most honored and respected citizens, I beg you to be assured that the people of Columbia deem themselves honored by your having selected this as your place of meeting, and we hope to make your welcome to the capital so cordial that you may carry away with you to your distant homes, only pleasant and agreeable remembrances of the congress at Washington. I thank you for your courteous attention.

Dr. PEPPER. Members of the first Pan-American Medical Congress, ladies and gentlemen: In assuming duties devolved upon me by the

choice of the executive committee, it will be my duty to address to you to-morrow evening some remarks concerning the scope of this congress, as those of us who have been working in it have comprehended it. It would, therefore, be improper for me this morning to occupy your time or detain you from the programme which has been arranged.

You know the joint resolution authorizing the invitation presented by the President of the United States has been cordially accepted by every one of the countries addressed; and, following this acceptance, there have been appointed official delegates from those countries to join us here in this congress. It is, therefore, eminently fitting that the representatives of these countries should be called to speak for the their constituency and for their respective governments. We have heard from the president and our distinguished host of Washington, D. C., how large is the work before this congress, how earnest is the hope that this congress is but the first of similar meetings to be held at different points throughout this great territory for the purpose of bringing together experts most competent to discuss and pass upon questions of enormous municipal, national, and international importance. We have called this congress a Pan-American congress. This is in accordance with race usage. Why not simply American? Are we not to-day upon the brink of that larger conception of what this great continent really is? That it is all really, truly American; that all residents upon it, from Puget Sound to the Straits of Magellan, are alike Americans, with a destiny, with international relations which necessitate national occasions, with political aspirations, which render cooperation attractive and easy. I would myself hope to see, if not at this single meeting at least at several meetings held at various parts of this continent, the American Medical Association merged into the Pan-American Congress, and see it meet in Mexico and Montreal, as well as in Washington. But these are features for the future; quite enough for the present the questions of importance to be presented in the different sections.

And now, in accordance with the programme, I shall have the honor of calling upon the several countries, and if there should be a representative here from any of them, we would be glad to hear from him what words of courteous cheer he can give us. We shall now have the pleasure of hearing from Prof. Pedro Lagleyze, of Buenos Ayres, on behalf of the Argentine Republic:

Señor Presidente del Congreso Médico Pan-Americano—Señores: Anhelosa siempre la República Argentina, de seguir el movimiento científico determinado por los grandes centros, no ha podido vacilar un instante en corresponder á la invitación que le fué dirigida para concurrir á este acto. Si he de interpretar los sentimientos de su Gobierno, cuya representación invisto en este momento, mi primera palabra debiera ser de gratitud, una vez que se le ofrece la oportunidad de realizar sus nobles y grandes propósitos.

Las ciencias médicas, señores, como sabeis, atraviesan actualmente un periodo de evolución esforzándose sus cultores en enriquecerla dia á dia con nuevas y valiosas revelaciones, y el continente Americano no queriendo permanecer, indiferente al gran impulso dado á aquella por la Europa, ha creido llegado el momento de incorporarse ostensiblemente al movimiento, mostrando al mundo, no solamente el progreso material de sus hijos industriosos y comerciales, sino su progreso intelectual en las ciencias y en las artes.

El Congreso Médico Pan-Americano es el primer esfuerzo, que, unidos por el vínculo fraternal del continente que habitamos, hacemos en el tortuoso sendero de la medicina persiguiendo juntos los ocultos secretos de esta ciencia misteriosa.

El espíritu investigador de los genios del viejo continente ha iluminado un rincón del sendero y nos ha enseñado á marchar con la brújula de la paciente investigacion experimental.

Aprovechemos el trabajo de los viejos, juntemos nuestras observaciones, comparemos nuestros resultados, apliquemos con abnegacion nuestras jóvenes facultades persiguiendo la verdad en el estudio de la difícil ciencia, y, llevemos, sobre las tibias aguas del Gulf Stream que vivifica una gran parte del viejo mundo, el calor de nuestra inteligencia, contribuyendo al eterno fuego del espíritu de la familia humana.

Con estos votos, Señores, permitidme que yo, humilde miembro de este Congreso os ofrezca todo mi modesto concurso en mi triple carácter de Representante del Gobierno Argentino, de delegado por la Facultad de Ciencias Médicas de Buenos Aires y del Círculo Médico Argentino.

Dr. PEPPER. We shall next have the gratification of listening to the official representative of the Government of Jamaica, Dr. Phillippo, of Kingston.

Mr. PHILLIPPO. Mr. President, ladies, and gentlemen: I come before you now as a representative of a very small island lying not far off of your coast. I come from the island of Jamaica. I claim it is the earliest portion of the Western Hemisphere discovered by Christopher Columbus. Next year will make 400 years since Christopher Columbus landed upon the coast of Jamaica. He loved the island so much that he returned to it. Indeed, it is said that when a person once touches the coast of Jamaica, he is bound to go there again. Christopher Columbus there met with various misfortunes, being deserted by his followers, imprisoned, and sent home in chains.

Jamaica has now passed a stormy youth. She has been the refuge of buccaneers and pirates, and has suffered from earthquakes, and hurricanes. But she became wealthy after all, and has become what is known as the key of the Gulf of Mexico. Great Britain holds Jamaica as the key, because from that position she can command nearly all of the islands, as well as the Gulf itself. For the same reason of her geographical position the islands should be looked upon as one of the outposts of the United States. If your meteorological

department had recognized the importance of this position we could have forewarned you of the advance of the recent hurricanes. As one of the outposts of America, we have also something to do with the epidemics which come to you. However, we scorn such things as "epidemics." We do not believe in them, because we have put our house in order and have drained our sewers—or are about to drain them.

We are like the Phœnix rising from its ashes. We send you not only sugar and rum, but now we are sending you that fruit which I find in your streets, the Jamaica banana, which you seem to relish very much. A large and growing capital is invested in this trade We have been visited by your medical men, and all give glowing descriptions of Jamaica. I hope to see you coming down there. Gentlemen of the Pan-American Medical Congress, I rejoice to be with you; I have much to learn sitting here at the feet of your professors, learning from them what I hope will be of use to me hereafter.

Dr. PEPPER. There has been a slight change of the order of business. We have with us this morning one to whom more than to all others—I can not say to whom exclusively—is due the success of this project. It gives me the greatest pleasure to have the honor to call upon Hon. J. B. McCreary, of Kentucky, to answer briefly for the Congress of the United States.

Hon. J. B. McCREARY. Ladies and gentlemen of the Pan-American Medical Congress: I came this morning only to pay my respects to this great body, and my presence was discovered only a few moments ago: I did not expect to be introduced to this great assembly, but I desire to say that it gives me much gratification and great pleasure to be with you on this occasion. The Congress of the United States passed the bill under which you are holding your meeting without hesitation, and unanimously. When the physicians of the United States seemed to desire that the physicians of the Western Hemisphere should assemble in the capital of our country, the members of the House of Representatives said, with but one voice, "We will be glad to have them with us, and we will welcome them to Washington." The Congress of the United States has in past years, through another Pan-American Congress, tried to cultivate commercial and social relations with all the republics of the Western Hemisphere. This convention follows properly that congress, and, I hope, Mr. President and gentlemen of the Pan-American Medical Congress, that this is but the beginning, and that there will be many other Pan-American medical congresses to raise the standard of health of the people, to promote as far as can be done the prosperity of the country. I hope your session in our capital will be successful. We all give you a hearty welcome, and if you should again desire any legislation from the Government of the United States, I should be very glad to be the humble instrument in trying to get it for you.

Dr. PEPPER. Now I have the honor to call on a gentleman from British America, who has charge of the immensely important duty of

guarding the sanitary condition of the St. Lawrence River, Dr. Montizambert.

Dr. MONTIZAMBERT. Mr. President, ladies, and gentlemen: Like the previous speaker, when I entered the building I had not the remotest idea of being called upon to address you. I regret that for one reason, but you may be assured that whenever there is an occasion of interchange of cordial expressions, or a desire of international courtesy, international coöperation, international work, British America will never need to look far for a speaker when I am present. I regret that I have not been able to devote more attention to this subject than I have, that I might take a wider view of it than I am able to this morning.

My own work is not a little severe, and you I trust will bear with me if, under the circumstances, I am obliged to confine the remarks I am to make to-day to the branch with which I am most familiar, that of hygiene and quarantine.

It was in the autumn of 1884, as far as I am aware, that the first step was made towards the international work between your Republic and the little neighbor to the north. The Government of Washington, in view of the threatening of cholera at that time, invited delegates to an international congress to be held in this city in December, 1884. I had the honor of representing my Government as a delegate on that occasion. Since then I have continued yearly to exchange information concerning the public health, and a vast amount of good has resulted from it. It is reasonable to believe that some good results will arise from this movement. I may mention as a small instance of the practical work of this national exchange the protection of our own country from the entrance of certain diseases from abroad. We have inaugurated certain means for meeting the emergency. The Government at Washington communicated with the Government of Canada with a view to sending officers to inform the people of the work carried on. This was met by our Government cheerfully, and now there are officers representing the Marine-Hospital Service of the United States who are present and are in a position to assure their Government, and through their Government the people, that the means of prevention are efficient. We work together with the utmost unanimity and cordiality. You will excuse me for giving this illustration, but it brings it down to practice, and it is practice which arises in the interchange of views that gives them their practical value. I thank you most cordially, Mr. President and gentlemen, and I can only say to you that British North America most cordially joins in the sentiment before expressed, hoping for the unqualified success of this great convention.

Dr. ULLOA, Costa Rica. Mr. President, ladies and gentlemen: I feel bound by courtesy to address you in your own language, though my speech, following upon the gentleman who has just spoken, may appear like the bringing in of a candle when the electric light is taken out,

As the representative of one of the smallest Republics of the continent I salute these great Republics, expressing my earnest wishes for the continuous prosperity of this congress. I come from Costa Rica, the country from which we send you coffee and bananas in exchange for your various and valuable products. Your kindness has been so great toward all of us that we have no words to express our thanks. I wish, however, to express my best wishes for the success of the congress and the prosperity of your hospitable people.

Dr. PEPPER. In the absence of representatives at this moment from the Dominican Republic and Ecuador, I know you will join me in a cordial greeting to a representative of that body, to whose initiative and influence this congress owes its existence. I will call upon Dr. J. F. Hibberd, president-elect of the American Medical Association. [Applause.]

Dr. HIBBERD. Mr. President, ladies and gentlemen: This, somehow or other, seems to be a morning of surprises. Several of the gentlemen who have spoken before me stated they were not aware of the privilege and happiness they would have of addressing you until after they came in the room. It struck me with perfect astonishment that I should be called upon to make any remarks in the presence of other gentlemen, representing other countries, whom I supposed would be called upon to speak. However, as American citizens, all of us must be prepared for the emergencies of life, and, when great things happen to us individually, we must expect other difficulties to be made opposite the line of current events, and so is it this morning. But it gives me great pleasure to come here and greet you as an organization which had its initiative in the American Medical Association. It is very true that that association has in the past regarded itself as the parent of most of the other organizations in this country, and we, as a parent organization, love them and encourage them, and love to have them grow up in their proper spirit of good science and good morals. But I have not until this moment thought of the prospect of the coming of something which may be more extensive and perhaps wider than the American Medical Association. That is the Pan American Medical Association.

Now, we are a large country, but we acknowledge the whole continent is larger than the United States. If it turn out in the future that what has been initiated here this morning will grow and expand, as we have reason to believe it will, the American Medical Association will, perhaps, after a while have to consider itself only a part of what spreads over the whole America. I can assure you from my own feelings, as I can appreciate the feelings of the whole American Republic, if this greater organization regard us as a part, we stand ready to bow to that greater organization. We will, therefore, expect to see the congress that is inaugurated here this morning grow and extend the sphere of its scientific influence, and give renewed encouragement to

the social relations existing between the nations of this continent. And we will always be glad to have you here in the United States. However, we will consider ourselves, the American Medical Association, to be the largest and best association in the world, and I heartily invite you all to meet us in San Francisco next year.

Dr. PEPPER. I will now call upon the secretary-general for his report. At some other time there must be made to the secretary a suitable expression of the gratitude due him for his foresight in formulating the suggestion and for his devotion, and ability, and tact, and patience, and faith, which have brought about this great and fully realized successful day.

Dr. C. A. L. REED. The congress as it stands to-day must constitute my report. The work of organization, which has devolved largely on the secretary-general of this congress, has been exacting in many particulars, but it has withal been an extremely pleasant task. The movement was inaugurated by drafting into the service the distinguished gentleman who presides over our deliberations to-day. The movement was next seconded by the Congress of the United States, largely through the instigation of the distinguished ex-governor of the State of Kentucky, who has addressed you this morning. It was seconded in the Senate of the United States by that grand peer of statesmen, Senator John Sherman, of Ohio. The movement was ratified in the executive circle by the President of the United States. At a later stage, when an appropriation was found necessary, the committee received the zealous and efficient support and management of that friend of progress, Senator Gorman, of Maryland. In that particular way this congress is a governmental protegé. Not only were these movements heartily seconded and heartily pushed forward in the United States, but the medical profession all over this country and all over the neighboring countries and colonies responded with an unanimity and enthusiasm, which made the work both easy and pleasant. The governments of the neighboring republics and the neighboring colonies responded and, although some of the delegates have failed to arrive to this date, in nearly all of those countries the delegates have been appointed by the government.

The work has touched and embraced every medical society from Bering Sea to the Straits of Magellan. To-day on the official manifesto of this congress you will find the names of those who have accepted offices on behalf of practically every local medical society of the Western Hemisphere, embracing a profession numbering over 150,000. The membership of this congress has been opened wide unto the medical profession, and the invitation issued has been responded to with the characteristic enthusiasm of all the American peoples. As I stated before, the formal report of the secretary-general must be found in the hand-book of the congress, which I will not endeavor to read in your presence. Thanking you all for your cooperation, I wish you Godspeed in the work before you.

Dr. PEPPER. I do not wonder that the honorable Mr. Rice referred to the medical profession of Washington. They have been taxed and taxed again, but they never fail to respond, and never has the profession of Washington come forward with more interest and zeal than in providing for the details of the actual work of this congress. I have therefore particular pleasure in calling upon the courteous chairman of the committee, Dr. Samuel S. Adams, of this city.

REPORT OF THE COMMITTEE OF ARRANGEMENTS, BY SAMUEL S. ADAMS, M. D., CHAIRMAN, WASHINGTON, D. C.

Mr. PRESIDENT, LADIES AND GENTLEMEN: Before making a very short speech, I think it is but proper to state that in the formation of this congress it was necessary, for the recognition of the congress by the Government of the United States, the invitation having been extended to foreign countries to send representatives to this country, that an appropriation should come from the Congress of the United States in support of the necessary expenses that would be entailed by such an undertaking. All of us, but more particularly those of this territory, know with what difficulty appropriations are engineered through the various committees. After the recognition of this appropriation in one House, owing to other important matters, it was passed over, was ignored. It was taken up in the Senate, and those gentlemen passed it, but the final act was in the joint committee of the House and Senate, when the Hon. Arthur Gorman, of Maryland, said "we will have it," and *we have it.*

It is through the energy of Mr. Gorman that I am able to give you entertainment which will reflect credit upon the Congress which donated this money. When selected for this important position, I with some diffidence accepted the invitation of these honorable gentlemen, thinking I was not equal to the task, thinking the duties should fall upon those much older in years and experience; but they said they wanted young blood. The gentlemen selected one of the younger members of the profession for this duty. It has been the endeavor of my associates, I assure you, to present a programme satisfactory to every individual here present. While many of our seniors have been basking in the sun and playing on the sands of the seashore, we have been laboring, during the heated periods of June and July, in an attempt to complete the arrangements, in order to have the congress to move smoothly. [The doctor then made the announcements of the committee of arrangements.]

Dr. PEPPER. I would simply emphasize one point, that is sharp punctuality. The number of sections is unprecedentedly great. The one to which I would call particular attention is that of pedagogics, because the questions of education that will there be brought up will be of extreme importance.

As soon as the general session is over, the members should make up their minds as to the section they will attend, that the sections may meet with equal promptitude. Thus only will it be possible to cover the ground fully. The next item on the programme is an address by Prof. Francisco A. Rísquez, M. D., Caracas, Venezuela. There will be a general address of this character each day.

LA TERAPÉUTICA Y LA FLORA AMERICANA.

DISCURSO LEIDO POR D DR. FRANCISCO A. RÍSQUEZ.

DE CARACAS, VENEZUELA.

Aún conmueve mi espíritu la impresión producida por la noticia oficial de habérseme elegido para el discurso de orden, en esta asamblea general del primer Congreso Médico Pan-Americano. Tan alto puesto, que, discernido á una autoridad científica, le habría dado motivo de justo orgullo, asignado á quien no tiene más títulos que un entusiasmo inagotable por los estudios médicos, constituye una distinción tan abrumadora, que no encuentro como pudiera traducir mi palabra la inmensa gratitud de que me siento poseído.

Yo me reconozco, en verdad, tan pequeño para ocupar tan distinguido puesto, que no me habría resuelto á aceptarlo si no hubiese encontrado como explicármelo, y traído en mi auxilio una personalidad bastante digna para merecerlo, bastante grande para corresponderlo. Sí, Señores; yo recojo ese honor en nombre de Venezuela, la hermana cordialísima de la república de Washington; es ella quien por mis labios expresa su reconocimiento á la Comisión organizadora de este Congreso, por tal distinción, que ella recibe como el obsequio cariñoso que la noble patria del Libertador del Norte América tributa á la tierra gloriosa del Libertador de la América del Sur. Venezuela no olvidará jamás, que los organizadores de este Areópago de sabios, le han cedido el derecho de enarbolar un dia el estandarte de la medicina en las alturas de este monumento, levantado por la primogénita de la libertad americana al adelanto científico del mundo de Colón.

Y un momento más antes de comenzar. Hijo de raza hispana y casi extraño á la hermosa lengua de los descendientes de Albión, yo debiera, ya que me es forzoso dirigiros la palabra, hablaros en mi nativo idioma; pero yo me tildaría de descortés, si, por aprovecharme de la ventaja que me brinda la circunstancia de ser el español una de las lenguas oficiales de este Congreso, no me conformase con sujetaros á la necesidad de oirme, sino que os condenara, además, á la tortura de un discurso científico en un idioma desconocido para la mayor parte de vosotros. No; yo tengo que agotar mis facultades por corresponder á la esquisita galantería del Comité Ejecutivo, y fiándome por completo á vuestra benevolencia, que escusará mis defectos de lenguaje, agregaré á mis esfuerzos por agradaros, uno más: el de expresarme en inglés.

Algo habré, sin embargo, de ganar en el cambio: nacerán mis ideas pobres de todo valor intrínseco, pero las presentaré engalanadas con las bellezas que presta á la palabra vuestro dulcísimo idioma, enriquecidas con el mérito de esta lengua del Norte, que, merced al estupendo progreso que hora tras hora viene realizando esta poderosa nación, lleva camino de convertirse, en un porvenir no muy lejano, en el idioma universal del mundo culto.

Y ahora, si he de ser yo quien venga á atar con las débiles amarras de mi palabra la atención de esta asamblea; ¿dónde encontrar el tema cuyo desarrollo pueda interesarle? ¿Qué frutos podrá producir mi inteligencia, que en la vuestra no se hayan sazonado ya? ¿Qué nociones pudiera yo traer á vuestro examen, que no fueran asuntos familiares á vuestro saber?

Pero al fijarme en que es la época conmemorativa del suceso más grande que registran los anales de la humanidad, dilato mis miradas por el Continente Colombino, y deteniéndome ante la exhuberante vegetacion de su privilegiado suelo, encuentro en ella el deseado tema, que me lleva á someteros un asunto digno de la consideración de los profesores americanos aquí reunidos, como que somos todos los hijos de este Mundo Nuevo en cuyo seno germina el porvenir, y en cuyo cielo resplandece ya el astro que ha de alumbrar los caminos del progreso á las generaciones venideras.

Voy á hablaros de la Flora Americana en sus relaciones con la medicina. Pretendo hacer desfilar ante vuestra memoria los tesoros que ella ha regalado á la humanidad doliente; quiero recordaros las riquezas que ella está ofreciendo al arte de curar, sin darle más trabajo que el de estender la mano para tomarlas; aspiro, en fin, á señalaros los veneros que la vegetación americana guarda para el investigador, como si fuera la flora de la América el galardón reservado por el Supremo Hacedor á los esfuerzos de la ciencia, en su lucha secular contra las enfermedades y la muerte.

Señores! La terapéutica, hija del empirismo, esclava en sus primeras edades de los caprichos del acaso y aguijoneada por las necesidades del arte, tuvo que aprovecharse de cuantos recursos le brindaba la naturaleza en sus múltiples fuentes.

Los tres reinos le abrían de par en par sus puertas, y el mineral, como el vegetal y el animal, llenaron de drogas los arsenales de la farmacología. Pero á medida que los progresos de la ciencia van haciendo luz en la materia, el reino inorgánico va cediendo su primitiva importancia al reino organizado: á los metales nobles de entonces suceden los productos vegetales de ahora; á los compuestos minerales del pasado reemplazan los alcalóides orgánicos del presente y á las preparaciones inasimilables preconizadas ayer, se sustituyen hoy los principios organizados que van á unirse con nuestras células en combinaciones biológicas.

Y en efecto, la terapéutica moderna no es la aplicación de agentes

cuyo contacto parece despertar, de un modo puramente mecánico, los actos celulares, perturbándolos en su proceso; la terapéutica de hoy no basa su confianza en el cobre ó el antimonio, el oro ó el arsénico, la plata, el zinc ó el plomo, que no tienen representación en nuestro organismo, y que no pueden, por tanto, incorporarse al movimiento vital de que dependen las reacciones salutíferas.

Nó; los elementos histológicos de nuestra organización requieren principios semejantes que, asimilándoseles, puedan modificar la composición y propiedades del elemento vivo; la terapéutica de fines del siglo XIX contesta con el *similis similis* al *similia similibus* de las postrimerías del siglo XVIII, esfuerzo reaccionario provocado por el *contraria contrariis* de las épocas hipocráticas, y es, en suma, el reino organizado el que hoy levanta en alto el estandarte de la farmacología.

Sí; de los principios inorgánicos que repletan los anaqueles de los droguistas, no pueden quedar ya sino aquellos que forman parte integrante de nuestro sistema; los demás tienen que desaparecer como elementos extraños, ó quedar reducidos á sus efectos tópicos sobre las superficies con que se ponen en contacto; todo cuanto no sea principio constitutivo de nuestro organismo, está fuera de aplicación al cuerpo vivo, cuyos actos todos derivan del movimiento base de la vida: el proceso nutritivo, esto es, la asimilación, la transformación y la eliminación.

Partiendo de este punto, vemos ya la terapéutica encauzarse por una vía racional y científica, y en tres corrientes repartirse la tendencia de los modernos terapeutistas.

En Europa, donde el constante esfuerzo de las inteligencias parece ser el único aliento fecundador de aquella naturaleza relativamente estéril, agítanse los sabios en el anhelo de arrancar á las combinaciones de la química orgánica los agentes medicamentosos ; y encerrados en el laboratorio, uniendo y desuniendo átomos, reemplazando con el batallar del artificio, el espontáneo obsequio de la naturaleza, avara ya, si algún día fué generosa, con los hijos del Viejo Mundo ; y unas veces, empeñados en buscar el alivio de los sufrimientos por la supresión del dolor, ó la provocación del sueño, mientras otras, guiados por el espíritu de la época, que hace dominar el panspermismo en biología, mostrando en todas partes microorganismos como causas, y exigiendo sin tregua microbicidas como armas de combate, van dando á luz, día tras día, hipnóticos y analgésicos, antiparasitarios y antitérmicos, de los cuales gran número viven efímera existencia, se usan mientras curan, para relegarse luego á la fosa común de lo innecesario, sin dejar otro recuerdo, acaso, que la penosa gestación que precedió y las angustias é inquietudes que acompañaron su advenimiento al mundo de la terapéutica.

De este modo es como han venido á tomar puesto en los estrados del arte, atrayendo con irresistible fuerza la atención de sabios y de vulgo, de profesores y de clientes, los fenoles y los naftoles, los salicílicos y la antipirina, el paraldehido y el sulfonal, el mentol y la agatina, el aristol

y el guaiacol, la piridina y las fenacetinas, los etilos y metilos, la pioctanina, el somnal, y tantísimos otros que se aglomeran y reemplazan, aparecen y se extinguen, ó nacen y perduran, llenando de inagotables capítulos las páginas de la farmacología.

La América, por su parte, orgullosa de su fecundo suelo y enamorada de la naturaleza, hija de la Suprema Inteligencia Creadora, más que del arte, engendro del ingenio imitador del hombre, se dedica á estudiar las propiedades de sus plantas, las analiza y ensaya, las entrega luego al farmacéutico para que les dé forma, enriquece la terapéutica con sustancias de gran mérito é inunda los mercados del orbe con las producciones de sus tierras.

Del examen de los vegetales nace la extracción de los principios activos y la reducción de las drogas á la quitesencia de su actividad; los alcaloides, los glucosidos y los aceites esenciales surgen á la arena de la terapéutica combatiente, llenan el presente, señalan el porvenir y halagan de tal modo los anhelos del arte, que el genio de Burggrave se apodera de ellos y funda la Escuela Dosimétrica, á la vez que sobre sus mismos cimientos, alza sus reales la medicina hipodérmica, la última expresión, la idea más práctica y el médico más seguro del arte de administrar medicamentos.

Y finalmente, en el Viejo como en el Nuevo Mundo, el concepto patogénico de las enfermedades infectivas y contagiosas, y la nueva concepción de la naturaleza de las enfermedades, por desgaste de los principios constitutivos de los elementos anatómicos, abre magníficos horizontes á la terapéutica profiláctica y curativa: las inoculaciones iniciadas por Pasteur en Francia, hechas ya universales, las inyecciones de jugos animales, ideades por Brown-Séquard, en Europa, y modificadas por Hammond en los Estados Unidos, y las transfusiones de sueros, ahora en estudio, representan hoy el último adelanto del arte de curar, y van camino de lo futuro, generalizando los principios, extendiendo el método simplificando los procederes, hasta ver de hallar el modo de contrarrestar la tremenda fatalidad que pesa sobre el linaje humano, condenado desde su cuna á sufrir y á morir.

Hé ahí compendiados el pasado, el presente y el porvenir de la terapéutica: ayer, el reinado de los medicamentos de origen mineral, con sus luchas, sus conquistas, sus glorias y sus desastres; hoy, el reinado de los principios orgánicos, con sus productos artificiales de laboratorio y los productos naturales de la flora de ambos mundos; mañana, el reinado puramente animal, representado por el tratamiento de las enfermedades del animal por sus mismos productos.

No hay duda alguna: la terapéutica vuela con las alas que le presta el siglo del vapor y la electricidad, abandonando á la industria los metales que un tiempo le sirvieron á sus necesidades, y tendiendo á un mañana en que el animal ha de suministrarle sus principales armas de combate. Ella avanza desdeñando los esfuerzos por arrancar á los minerales, ó sacar de las retortas, en ese microcosmos de las combina-

ciones del carbono, los elementos de la terapéutica y saludando á su frente ese espléndido porvenir, que el empleo de los productos bacterianos y los jugos y humores animales anuncian á la medicina.

Pero, si de ese ayer no debemos ocuparnos ya y ese mañana no nos pertenece todavía, pensemos en aprovechar los recursos de hoy, ya que nuestras necesidades apremiantes reclaman la diaria intervención; si la Providencia, que dió al oso del polo su vellón aislador y plantó las palmeras en las abrasadoras soledades, ha colocado siempre los recursos al lado de las necesidades, consagrémonos á interpretar, á la luz de los modernos adelantos, las advertencias que ofrece para el alivio de nuestros males esta "naturaleza colosal, que parece," ha dicho un escritor venezolano, "elegida por el Autor de lo Creado para levantar su trono de regalo y pasatiempo."*

La flora americana tiene en medicina una historia gloriosa, como no la ha tenido flora alguna. El valioso contingente ofrecido por ella á la terapéutica, no reconoce rival. Ella reveló á los indígenas del Perú ese agente poderoso que viene arrancando víctimas á la insalubridad de nuestras zonas, desde los remotos días de la Condesa de Cinchón: ya comprendeis que me refiero á la *quina*. Ella hizo brotar en el suelo brasilero la inimitable *ipecacuana*, con todos los méritos de un específico sin sustituto, en el tratamiento de la disentería que diezma las comarcas tropicales. Ella ha ido más allá todavía de esa obra tenida por divina entre los antiguos, de calmar el dolor, ha suprimido la sensibilidad al darnos la *coca*, antes limitada á sostener las fuerzas del trabajador peruano, ó embotar el hambre del indio acémila, y hoy fuente preciosa de ese alcaloide, la *cocaina*, que va invadiendo en el campo de la anestesia los dominios del éter y del cloroformo, un día surgidos á la voz de Jackson (de Boston) y Simpson (de Edimburgo), como el más trascendental descubrimiento en terapéutica quirúrgica, base de los prodigios que la mano audaz del arte ejecuta en el hombre vivo trocado en masa inerte.

Yo no podría en el rápido bosquejo que voy á diseñar, ni ello conduciría á mi objeto, hacer una enumeración completa de los tesoros de la flora médica americana. Para obra de tanto vuelo é importancia, yo habría necesitado un tiempo y unas facultades de que no he podido disponer. Solo pretendo citar, á manera de muestras, y como estímulo á la obra de mis anhelos, sus principales plantas medicinales conocidas, para llegar á mi objeto principal, cual es invitaros á explorar la flora americana, desentrañar las riquezas ignoradas en que ella abunda, para gloria y provecho de la América y beneficio y satisfacción de la humanidad.

En las naciones del sur, Chile nos da, entre otras, la *Quillaya saponaria*, tan útil en las afecciones bronco-pulmonares, como necesaria, merced á sus especiales propiedades emulsionantes; y el *boldo*, *Boldea fragrans*, de Jussieu, *Peumus boldo*, de Molina, con sus principios excitantes aún no del todo estudiados y su acción benéfica, ya general-

* Cecilio Acosta.

mente reconocida, en las afecciones del hígado y de las vías génito-urinarias.

El Paraguay y Uruguay nos dan la *contrayerba*, que quiere decir *antídoto*, planta del género *Dorstenia*, que á sus efectos tónicos y estimulantes une los muy notables antisépticos; y el *mate*, *Ilex paraguayensis*, sustituto americano del té chino, igual á éste por sus propiedades excitantes y su aroma, el compañero inseparable del peatón viajero y el tónico cardiaco que compite con la cafeína y la teína. En tanto, la República Argentina nos suministra, como especialidad digna de mención, el *quebracho*, *Aspidosperma quebracho*, la digital del pulmón, como se ha llamado por sus propiedades eupneicas, y todavía no enteramente ensayado.

Más al norte, Bolívia y el Perú dán á más de la *quina* y la *coca*, que por si solas son dos monumentos de la terapéutica, la *ratania*, del género *Krameria*, el precioso tónico astringente descubierto por Ruiz en las tierras arenosas de las cordilleras perú-bolivianas; el *matico*, *Piper angustifolium*, de Ruiz y Pavón, cuyas propiedades hemostáticas y antiblenorrágicas le han asignado puesto de alto valor en terapéutica; y el *coto*, con sus derivados alcaloídicos, que en las afecciones gastro-intestinales suple con ventajas al opio, al tanino y á los demás astringentes vegetales reunidos.

Y el Brasil, la tierra de la ipecacuana, suministra también el *jaborandi*, *Pilocarpus pennatus*, único en su acción combinada de eliminaciones por las vías salivares, cutánea y urinaria; la *Paullinia sorbilis*, que reune en alto grado las propiedades de la cafeína y el tanino; la *pareira brava*, de propiedades al mismo tiempo diuréticas, emenagogas y febrífugas y los *berros del Pará*, *Spilanthes oleracea*, excitante y anti-escorbútico.

De los países de la Antigua Colombia, el Ecuador suministra la *Ambrosia artemisæfolia*, cuya múltiple acción estimulante, emenagoga, antihelmíntica y antihistérica, es explotada á diario en el país de su origen; el *paico*, ó té de España, *Chenopodium ambrosioides*, que reemplaza al verdadero té y se utiliza en medicina por sus virtudes como sudorífico y diurético, tónico estimulante, carminativo y antihelmíntico seguro; en fin, la *guayusa*, tan reconocida por el vulgo como eficaz en las perturbaciones dolorosas del aparato digestivo, que allí es frecuente decir: "Nadie se muere aquí de cólico porque tenemos *guayusa*."

Y la República de Colombia, el famoso *condurango*, *Gonolobus cundurango*, que un tiempo desdeñado por motivos de errores en la elección de la planta, ahora parece renacer con mayor crédito para combatir las lesiones sifilíticas y cancerosas; el *cedrón*, *simaba*, ó *Quassia cedron*, tan celebrado como específico contra las mordeduras de las culebras venenosas y contra la rabia, y que aún conserva su reputación como febrífugo y estomáquico; y el *palo matias*, *Croton malambo*, cuyas virtudes medicinales de alto renombre entre los nacioenals, merecen estudio especial y el puesto á que lo hacen acreedor en terapéutica.

Méjico y las naciones de Centro América son también ricas en plantas medicinales. En éstas abundan las mejores especies de *Smilax*, zarzaparrilla, harto conocida, y cuya fama raya en las alturas de un específico vegetal; ellas comparten con la República de Colombia la principal producción de los bálsamos llamados del Perú y del Tolú, *Myroxilon toluifera* y *pereiræ*, que están á la cabesa de las drogas balsámicas empleadas en medicina, y de ellas sale la famosa madera de *campeche*, *Hematoxilon campechianum*, tan usada en la farmacia como en la industria, por sus propiedades tánicas y colorantes.

Una de las ciudades de Méjico le dá nombre á una planta de frecuente uso, la *jalapa*, *Exogonium purga;* en su suelo se cultiva el obligado compañero de la zarzaparrilla, allí también común, el *Sasafras officinalis*, si decaído ya como antisifilítico, ensayado recientemente por las propiedades estimulantes de su aceite esencial, antiséptico respiratorio al mismo tiempo; la *cebadilla*, *Veratrum officinale*, fuente de la poderosa *veratrina*, antitérmico y analgésico y usada por el vulgo como inmejorable insecticida en todas las enfermedades originadas por los parásitos, tan abundantes en nuestras comarcas; y el *tlanepaquelite*, ó yerba santa, *Piper sanctuum*, recientemente estudiado por Don José T. Barriga, y en cuyo aceite esencial ha encontrado un anestésico local, y un antiblenorrágico, usado en forma de agua destilada.

Por su parte, el archipiélago antillano no escasea su concurso: ahí se produce el lecohzo, *Carica papaya*, de donde se extrae la papaína, tan justamente celebrada, que disputa su antiguo predominio á la pepsina animal; las diversas variedades de *quassia*, y de *simaruba*, la *Quassia amara*, la *Quassia simaruba*, la *Picrena excelsa* y la *Bittera febrífuga*, cuyas virtudes las hacen recorrer con brillo la escala de los amargos, recomendándose como febrífugas, antidispépticas, neuromusculares, parasiticidas é insectífugas; la *Piscidia erithrina*, que aún no ha sido bien estudiada, como sedante, hipnótica y analgésica, y la *cascarilla*, *Croton elutheria*, excitante, diaforética y antiemética; la *Asclepias curassavica*, catártico, emético, hemostático y antihelmíntico; la *Marantha arundinacea*, ó *arrowroot*, analéptica; el *Capsicum annuum* y el *fastigiatum* y muchísimas otras que, utilizadas empíricamente por el vulgo, están esperando la mano de la ciencia, que las saque á lucir sus calidades aún ocultas.

Y regadas en toda esa extensión de la América tropical, de quien dijo nuestro gran poeta A. Bello,

> ———fecunda zona,
> Que al sol enamorado circunscribes
> El vago curso, y cuanto ser se anima
> En cada vario clima,
> Acariciada de su luz, concibes;

entre los linderos de esa espléndida zona, desde los Estados Meridionales de la gran República Norte-Americana, hasta el corazón de Sur-América, la rica naturaleza ecuatorial derrama sus tesoros para la

medicina, entre los cuales sobresalen, á más de los ya nombrados, el *Coffea arabiga*, originario de otro suelo, pero aclimatado ventajosamente en el nuestro, hasta el punto de considerarlo como propio; el café, no menos útil por contener el alcaloide del corazón, más y más usado cada día en terapéutica, que por ser la base de ese "líquido predilecto del poeta, del que careció Virgilio y adoraba Voltaire," como ha dicho Delille; el *Theobroma cacao*, alimento de los dioses, regalo de los Lúculos y portador de ese precioso aceite infermentescible y de ese otro alcaloide congénere de la cafeína; el *Manihot utilissima*, que dá una sustancia alimenticia, un condimento apreciado, por fermentación, y un principio tóxico, el ácido cianhídrico, por maceración, y cuya fécula es la empleada en las farmacias de mi país como sustituto ventajoso de la harina de trigo; las variedades de *agave*, que alimenta á los indios, dá el *pulque* al mejicano, el *cucuy* á los hijos de Venezuela y es diurético y emenagogo á la vez; el *tabaco*, *Nicotiana tabacum*, tan alabado, como tan deprimido, pero siempre sostenido en su empleo como calmante, paraciticida, anticonvulsivo, sialalogo, estornutatorio, de propiedades, en suma, tan diversas, que aún se hace necesario precisarlas y asignarles su legítimo valor; y el *Zingiber officinalis*, el *copaifera*, las diversas especies de *malvas*, y muchísimos otros que no sería posible enumerar en este rápido bosquejo.

¿Y qué diremos de este dilatado territorio del norte, donde, si bien la naturaleza es pródiga en ofrecer, el arte es avisado para elegir y la ciencia avanzada para analizar y clasificar?

De aquí han salido, patrocinadas por la alta autoridad de la Farmacopea de los Estados Unidos, multitud de plantas que son hoy tesoro, de la terapéutica universal y gloria de la flora americana.

De muy antiguo figuran en los formularios la *serpentaria* y la *polígala*, y más tarde han venido presentándose el *Podophyllum peltatum* y el *Evonimus atropurpureus*, que comparten el primer puesto entre los colagogos vegetales de acción utilísima en los estados febriles de la zona tropical, complicadas casi siempre con congestiones hepáticas; la *Gaultheria procumbens*, cuya esencia, si como ligero astringente, buen aromático y poderoso antiséptico, presenta extensas aplicaciones, como la fuente del ácido salicílico y sus derivados, verdaderos específicos del reumatismo, es un valioso recurso terapéutico; el *Gelsemium sempervirens*, preconizado en las fiebres palúdicas rebeldes, pero no menos útil en las neuralgias y eficacísimo en la dismenorrea dolorosa; la *Cascara sagrada*, *Rhammus purshiana*, de alta recomendación como laxante y vigorizador de las fibras intestinales, el remedio, en fin, de la constipación habitual; el *Geranium maculatum*, cuyas virtudes tónicas y astringentes utilizamos á diario en el tratamiento de las diarreas hemorragias; la *Cimicifuga racemosa*, el suave sedante del sistema nervioso, alivio de los reumáticos y esperanza de los atacados de consunción; el *Viburnum prunifolium*, de grande utilidad en tocología; el *Hidrastis canadensis*, de múltiple acción sobre el hígado,

los intestinos y las membranas mucosas; la *Lobelia inflata*, de tanta utilidad en las afecciones espasmódicas de los bronquios, y la *Grindelia robusta*, que disputa al ioduro de potasio su virtud antiasmática; el *Hamamelis virginica*, elevado hasta el rango de específico en las hemorroides y hemorragias; el *Cactus grandiflora*, recien introducido en terapéutica y ya de grande fama en el tratamiento de las enfermedades del corazón, y las diversas especies de *Asclepias*, que pasan por diaforéticas y espectorantes, como el remedio de la pleuresia (pleurisy root); catárticas y anodinas, en el reumatismo y en el asma; alterantes y antihelmínticas; en la sífilis, la escrófula y los vermes; astringentes y hemostáticas, en las hemorragias y en la blenorrea, y finalmente, para no hacer interminable esta enumeración, el *Abies canadensis*, la *Sarracenia purpurea*, el *Arctostaphylos uvaursi*, el *Xanthoxylum caroliniannm*, la *Leptandra virginica*, el *Erigeron philadelphicus* y muchísimas otras.

Y si para cerrar ya esta rápida exposición, pasamos á mencionar las plantas medicinales de Venezuela, encontraremos un gran número de vegetales ricos en propiedades curativas, que los nacionales emplean empíricamente con tan notables resultados, que se han abierto campo en la profesión médica, mas sin tener aún el pase de la investigación científica y de la esperimentación clínica.

Allí se dá, por ejemplo, la *algalia*, *Abelmoschus moschatus*, almizcle vegetal, digno de competir con el producto de la cabra almizclera, y tan útil en perfumería como precioso en la medicación estimulante y antiespasmódica; la *cruceta real*, planta no bien clasificada, cuya corteza, de un pronunciado sabor amargo, goza de gran reputación como estomáquico y febrífugo, sobre todo en las fiebres intermitentes inveteradas; la *esponjilla*, *Luffa purgans*, enérgico drástico sustitute de todos sus congéneres y, quizá por esas mismas propiedades, empleado como contraveneno general; la *escorzonera*, *Cranolaria annua*, que nunca falta en las casas de nuestras puérperas, auxiliar importante en el tratamiento de las enfermedades de las mujeres por medio de las píldoras tocológicas del médico venezolano, Doctor Nicanor Bolet, de tanto crédito en toda la América; el *guaco*, *Mikania gonoclada*, *M. radicans* y *M. scandens*, usado por nuestros campesinos para la operación llamada por ellos, *cerrarse*, es decir, hacerse refractario al veneno de las culebras, por inoculaciones repetidas y á dosis crecientes del jugo de la planta, y que aparte esa virtud no comprobada aún científicamente, es un precioso tónico preferido á sus similares por todos los médicos venezolanos, en los estados supurantes; la *raiz de mato*, de fabulosa historia, *Aristolochia barbata*, que une á sus propiedades estimulantes las hemostáticas, hasta ser un mediamento obligado en todas nuestras fiebres graves de tendencia hemorrágica; el *totumo*, *Crescentia cujete*, cuyo fruto parece deber sus propiedades á un principio oleoso, usado por vulgo y profesores en los estados crónicos inflamatorios de las vias aéreas; el *merei*, *Anacardium occidentale*, cuyo nombre va ligado en la memoria de todo venezolano al del célebre naturalista y médico de origen francés, Doctor

Beauperthuy, víctima gloriosa de sus estudios sobre la elefantiasis, en la cual aplicaba, como cáustico destructor de los tubérculos, el aceite esencial contenido en el mesocarpio del fruto; el *yagrumo*, *Cecropia peltata*, recomendado por el médico venezolano Doctor G. Michelena, como succedáneo de la digital, y empleado generalmente en el asma, con un éxito de que puedo yo mismo dar testimonio; el *bejuco de cadena*, *Schnella splendens*, y la *calaguala*, *Polypodium crassifolium*, que no faltan en ninguno de los jarabes llamados depurativos, con los cuales se tratan y curan en nuestros campos y ciudades la sífilis y la escrófula, sin el socorro de los específicos de origen inorgánico; el *guachamacá*, planta que ha sido muy estudiada entre nosotros, sin haberse obtenido resultados contestes, pues mientras para unos es un veneno violentísimo, para otros es un remedio manejable; y la *brusca*, *Cassia occidentalis*, la *congrina*, *Aristolochia ringens*, al *guácimo*, *Guazuma ulmifolia*, el *llanten*, *Plantago major*, y la *verdolaguilla*, el *torco*, la *albahaca*, el *chiquichique*, la *fregosa* y centenares de otras, que fueron exhibidas en la Exposición del Centenario de Bolivar, hace diez años, en Carácas, en número de 482 especies, entre las cuales fueron escojidas, estudiadas y clasificadas por nuestro laborioso naturalista, Doctor A. Ernst, 279 y que en gran número encontraréis expuestas en un trabajo del Doctor E. Meier Flegel, de Carácas, que he enviado á la Sección de Materia Médica y Farmacología de este Congreso.

Pero no es eso todo. Al igual de esas plantas, cuyos nombres y propiedades son más ó menos conocidas, aún cuando no bien estudiadas, hay muchísimas otras que constituyen secretos de los indígenas, tan maravillosos algunos de éllos, que al no verlos y comprobarlos, se creería superstición de la ignorancia, engaño de la especulación, ó ilusiones de la sugestión.

Por ejemplo, ¿no habéis oído alguna vez hablar de ciertas hojas que, al aplicarse á la nariz, hacen brotar por ella sangre en abundancia, coercible instantáneamente á la aplicación de otra clase de hojas?

Hace ya varios uños que un hombre inculto, muerto después violentamente llevando su secreto á la tumba, despertó una sensación profunda en las poblaciones del Occidente de Venezuela y de Colombia, haciendo operaciones con el cuchillo en diversas regiones, sin derramar sangre, mediante la previa impregnación de la hoja cortante con una sustancia de origen vegetal, apellidada entonces, por el nombre del indocto, pero curioso cirujano, *hemostático de Perdomo Neira.*

Yo tengo referencias fidedignas de un hipnótico ó anestésico usado por una tribu india de Puerto Rico, que administrado internamente en cualquier líquido, produce un sueño que va, según la dosis, hasta un letargo profundo, durante el cual pueden practicarse cortes y operaciones dolorosas, sin que el sujeto experimente dolor alguno, saliendo luego de aquel sueño, con facilidad y sin peligro, mediante una aplicación distinta. ¿No os parece todo eso digno de la atención de la ciencia?

Y aquí mismo he traído, para presentarlo á vuestro exámen, un remedio que hasta hace poco ha permanecido secreto sin ser, no obstante, fuente de especulación, y de cuyo maravilloso poder he sido yo mismo testigo repetidas veces. Yo no pretendo que querais creerme por mi sola aseveración; aquí tenéis la sustancia; os ruego la esperimentéis, en beneficio de la ciencia y en provecho de la humanidad, si vuestras observaciones confirman los hechos que yo he presenciado y son de pública notoriedad en mi país.

Tomad un animal cualquiera y hacedlo morder por una culebra venenosa, ó aguardad se os presente el caso, aún en un ser humano; al aparecer la inflamación y la desintegración globular, reveladas por la enorme hinchazón y la hemorragia por diversas vías, admininistrad una dósis de este agente, de cualquier modo, en agua, en cualquier líquido, bastarán cuatro ó cinco granos (0.25 gr.) aunque puede administrarse en mayor cantidad, pues no parece ser tóxico: vereis inmediatamente bajar de un modo notable la hinchazón, fluyendo por la herida, sobre todo si la habéis desbridado, un líquido amarillento; cesar las hemorragias, restablecerse las fuerzas y á las pocas horas cesar aquel espantoso trén de síntomas, dejando al enfermo en aptitud de recobrar todas sus actividades.

Sabéis que en Venezuela abundan las culebras venenosas, como las varias especies de cascabel (*Crotalus horridus* y otras) la tigra (*Craspidocephalus atrox*), la mapanare (*Lachesis mutuus*), la coral (*Helax coralinus*) y algunas más de difícil estudio; pues bien, yo puedo testificaros una multitud de casos, de hombres y animales domésticos mordidos por estos ofidios, que han recobrado la salud en poquísimas horas, merced al beneficio de este medicamento prodigioso.

Os diré más: no hay en Mariches y Petare, sitios inmediatos á Carácas, campesino, cazador, ó hacendado, que no conozca ó lleve siempre consigo, en sus escursiones, esa sustancia, que en honor del agricultor que la descubrió, es llamada generalmente *el remedio de Vaamonde.*

Este remedio parece ser el bulbo desecado de una planta anual, de la famalia de las Aroideas, probablemente una *alocacia*, ó quizá la *Acontias helleborifolius*, que se marca durante el período de su vida en que brotan las hojas, para ser arrancadas en el período de su sequedad, cuando toda las savia se ha reconcentrado en el rizoma, conservándose como producto seco y fácilmente reductible á polvo. Esa investigación, sinembargo, está aún por hacerse.

Si, pues, tantas y de mérito tan notable son las plantas medicinales americanas; si solo falta, á fin de asignarles su valor real, analizarlas para separar lo útil de lo supérfluo, ensayarlas para precisar sus propiedades y entregarlas al arte para que les dé forma, aprovechemos la favorable oportunidad que nos ofrece esta congregación de médicos, para emprender esa tarea, que reflejaría luz de gloria sobre el progreso

científico del Nuevo Mundo y arrojaría torrentes de consuelo sobre la triste humanidad.

Yo quisiera ver surgir de este Congreso una asociación americana de materia médica y terapéutica, con un centro aquí, por ejemplo, y ramificaciones en todas las demás naciones del continente, dedicada á explorar la flora de la América, estudiar esas plantas medicinales consagradas por la experiencia desde los más remotos tiempos, y darle brillo de ciencia y forma de arte á cuanto hoy luce, á pesar de su rudeza en manos de los incultos hijos de nuestras comarcas retiradas.

Y voy á terminar. Yo me diría feliz si al abandonar este sitio á que me ha traido la obsequiosidad de la Comisión Organizadora del Congreso, y donde la benevolencia de este respetable concurso me ha dado alientos para sostenerme, llevase la satisfacción de no haber hecho propaganda inútil, y que mis pobres ideas y mis entusiastas anhelos han tenido eco en vuestra inteligencia y seguirán repercutiéndose en vuestro espíritu.

Que este Congreso sea el lazo que estreche, en nombre de la ciencia, la gran familia médica americana, y que esta época marque el principio de una era de progreso para la medicina en esta nueva Atlántida, con el auxilio poderoso de esta gran nación, cuna y altar del primero en la guerra, el primero en la paz y el primero en el corazón de sus conciudadanos.

SECOND GENERAL SESSION.

SEPTEMBER 6, 1893.

Prayer by the Very Rev. P. J. Garrigon, D. D., vice-rector of the Catholic University of America.

In the name of the Father and of the Son and of the Holy Ghost. Amen. O almighty and eternal God, the father of light, the fountain of all knowledge, and the author of every good and perfect gift, we offer to Thee to-day the homage of our adoration, we consecrate to Thy glory all the faculty of our being, and we beg Thy blessing upon all our labors, that they may indeed tend to the welfare of our fellow beings and to the accomplishment of Thy holy will which is all beneficence and love. Deign, O Lord, to direct the deliberations of this assembly; send forth into their minds the fullness of Thy light and into their hearts the outpouring of Thy love, that its members may learn, more and more, the knowledge of those things which it is Thy will their noble vocation should deal with, and that all their aims and purposes, in the discharge of their responsible duties may ever be well pleasing in Thy sight, and honorable and meritorious to themselves. O Savior of the world Who didst look with compassion, not only on the spiritual ills of thy poor suffering creatures, but hadst also regard for their bodily ailments; Who didst heal the sick and pour consolation in the hearts of the sorrowing, deign, we pray Thee, to bless this congress of noble men animated with the same spirit of charity towards suffering humanity. Fill them with Thy own Holy Spirit; fit them to be worthy agents and instruments of Thy merciful providence, and guide their deliberations this day towards wise and useful results. All this we ask in the name of the Father and of the Son and of the Holy Ghost, in those sweet, simple words of prayer which Thou, Thyself hast first taught us: Our Father, Who art in Heaven, hallowed be Thy name; Thy kingdom come; Thy will be done in earth as it is in Heaven. Give us this day our daily bread and forgive us our trespasses as we forgive them that trespass against us; and lead us not into temptation, but deliver us from evil. Amen. In the name of the Father and of the Son and of the Holy Ghost. Amen.

Dr. PEPPER. In calling upon the representatives of the various constituent countries this morning, I take pleasure in first introducing the official representative from that energetic Republic to the south of us, Guatemala, Dr. Juan Padilla.

Dr. PADILLA. Mr. President, ladies and gentlemen: Since Secretary-General Dr. Reed notified me that I had to speak before you, I have been in doubt whether I ought to do it in my mother tongue or in English. I finally made up my mind to address you in the latter, hoping to obtain your kind indulgence.

So much has been spoken, and so ably, about the importance, the beneficial results of the Pan-American Medical Congress and of the well-deserved praise due to the initiators of the great idea, that it would be too daring on my part to pretend to add anything on the subject.

I come from Guatemala as a delegate of its Government, and in its name and in my own I give my heartfelt thanks to the American people and their worthy President for their kind invitation so cordially extended to their little sister Republic.

In Latin America, and I speak more especially of my own native Guatemala, Paris, France, is looked upon as the Mecca of our profession by all our medical aspirants; but, without wishing to detract from the importance of Paris, I must say that the time has come when the young student of medicine from the Latin-American Republics should seek the light of the new Mecca of the Western hemisphere.

The actual President of my country feels proud whenever he has the occasion to state that he received his military education in the United States. Besides that, his wife is a beautiful and estimable daughter of this privileged land.

These two motives will serve, I hope, to strengthen the sympathy and good friendship now existing between both republics.

Before concluding allow me to express my regret that I bring no contribution for your transactions. I anticipate, however, that I shall not return to my home empty handed, but laden with the offerings of science and hospitality from the great Republic and her citizens.

Dr. Mendizabal, of Vera Cruz, responded on behalf of Mexico. In the course of his remarks he spoke of the great enthusiasm with which the medical profession of Mexico had met the suggestion of a Pan-American Medical Congress; how cordially it had responded to the invitation to send delegates to this meeting. There were many interests in common between Mexico and the United States, and these interests—mercantile, commercial, educational, and sanitary—will be largely promoted by the deliberations of this Congress; but over and above all will be prized by the Mexican delegates the warm friendships which this meeting has already engendered. He referred to the leading position the United States always took in advancing the different sciences. The progress of this country in medicine he noted at length.

The United States is the elder sister of Mexico in medical learning. While Europe is spending millions on discovering the best engines of war, the United States is spending its coin in furthering the different sciences.

He expressed the hope that a great deal of benefit would accrue from the meeting.

Dr. PEPPER. I have pleasure in introducing Dr. Luis Gilles, of Port au Prince, who comes to us as the representative of Haiti:

Dr. GILLES. Mesdames, Messieurs, M. le Président et honorés confrères: Le Gouvernement de son Excellence le Président Hyppolite et le corps médical d'Haïti auxquels vous avez fait l'honneur d'inviter à prendre part au meeting du Pan-Américain Congrès, nous députent auprès de vous pour vous exprimer en cette circonstance leur plus grande et leur plus sincère félicitation. L'idée que vous avez conçue de vous réunir en congrès médical est noble, et elle est largement partagée chez nous.

Nous avons le ferme espoir que votre œuvre grandira et se retentira dans le monde entier.

Aussi, n'avons nous pas besoin d'ajouter, M. le Président et honorés confrères, que nous nous tenons à la disposition du congrès pour tous les renseignements dont vous pouvez avoir besoin sur la médecine et la chirurgie d'Haïti.

Dr. PEPPER. The next gentleman to bring us greetings is the official representative from the ancient Republic of Peru. You will now hear from Dr. Manuel A. Muñiz, surgeon-general of the Peruvian army.

Dr. MUÑÍZ. Ladies and gentlemen: The Government of Peru, in accepting the gracious invitation of the United States Government, has appointed me its official representative in this first Pan-American Medical Congress, and I have great pleasure in giving public expression in its name, and in the name of the Peruvian Medical Corporation, to the feelings of friendship and good will entertained by the Peruvian people toward their great sister Republic, whose advancement and welfare they so fervently desire.

I believe, further, that this first Pan-American Medical Congress will aid the scientific fraternity of both Americas to accomplish fruitful results, on all the fields opened to our noble profession, for the benefit of mankind.

Then followed a general address by Prof. Rafael Lavista, M. D., city of Mexico, Mexico.

(Copy of the address of Prof. Lavista, of Mexico, has not been furnished for publication.)

Dr. PEPPER. One of the distinguishing features of this meeting has been the earnest effort our friends have shown to display their interest and participate in our work by acquiring such a gratifying knowledge of our language. It is not a small matter, for there is likely to grow out of these meetings a more rapid spread of the use of English as the means of international communication. I feel, however, we trespass somewhat on the intelligences of these gentlemen by limiting the announcements to English. You will therefore bear with me for repeating the announcements in French.

I am instructed to offer the following resolution:

Resolved, That in view of the importance of taking the necessary steps to insure the continuance and transaction of the great continental work of this congress, the international executive committee is hereby empowered and requested to appoint suitable international committees on the subject of the proper governmental recognition of State preventive medicine, upon a uniformity in American pharmacology, upon the subject of medical education, and upon such other subjects as may be in harmony with the general purposes of the congress. (Repeated in French.)

This subject is before the congress for action, for its discussion, or, if it meets the approval of the body, it will be put immediately to a vote. The idea is that this great meeting, which has been called together at such great effort and cost, shall not fail of definite results. The executive committee will no doubt report before we adjourn some recommendation for a second meeting, where and when, but in the interval between that time and this a feeling exists that there should be some mechanism started to insure continuous results. Of course this carries with it no appropriation of funds, and therefore does not compromise this meeting or the successive meetings. If the gentlemen find it necessary to spend money, they must get the money to spend. A motion to adopt the resolution was then put and carried.

Then followed the announcement of the committee of arrangements, by Samuel S. Adams, M. D., chairman.

Resolutions which had been adopted by the section on hygiene, climatology, and demography were then brought before the general session, and referred to the international executive committee. (See report of the international executive committee for copy of resolutions.)

An invitation was then extended to the members to visit the Museum of Hygiene. (Repeated in French.)

The chairman of the committee of arrangements then stated that the hospitals, both special and general, were open to the members.

The following resolution was reported from the section on hygiene, climatology, and demography, indorsed by the section on railway surgery for the action of the whole congress:

Resolved, That in the opinion of the section on hygiene, climatology and demography of the Pan-American Medical Congress the interests of the public health in every country should be and must be intrusted to a department of the government especially charged with their administration; and that, while the precise form of administration may be left to legislation, the indispensable requisites are that it shall be national, that it shall have parity of voice and influence in the national councils, that it shall have independent executive authority under the limitations common to other departments, and that it shall be intrusted to educated and experienced medical men, who alone are competent to assume its responsibilities.

The resolution was referred to the international executive committee.

The following resolution was then introduced by John A. Larrabee, M. D., of Kentucky:

Resolved, That the Pan-American Medical Congress has learned with extreme regret of the painful accident which befell the Hon. John W. Ross last night, and entertains the hope that he will be speedily restored to health.

Dr. JOHN A. LARRABEE, of Kentucky. Mr. President and members of the Pan-American Medical Congress: It has been but twenty-four hours since we listened to the eloquent and earnest welcome delivered to us by Commissioner John W. Ross, on the behalf of the District of Columbia. Before his words of greeting could be read by the thousands, the honorable Commissioner was stricken down by the most appalling accident, and now lies upon a bed of suffering in jeopardy of his life. "Thus in the midst of life we are in death." I therefore move that we, the members of this congress, do hereby express our profound sympathy with his sufferings and our earnest hope for his recovery by the adoption of the resolution which I have presented.

Unanimously adopted.

Adjourned.

EVENING SESSION.

METZEROTT HALL, *September 6, 1893.*

ADDRESS BY THE PRESIDENT OF THE CONGRESS, PROF. WILLIAM PEPPER, M. D., LL. D., PHILADELPHIA, PA.

GENTLEMEN OF THE FIRST PAN-AMERICAN MEDICAL CONGRESS: This occasion is an unique one, and the thoughts which force themselves on the minds of all of us are, I am convinced, so similar that the briefest greeting might well seem the most fitting address. But when I reflect that I stand here to represent the original committee appointed in pursuance of the resolution which was adopted unanimously on May 5, 1891, at the meeting of the American Medical Association, and that this resolution extended a cordial invitation to the medical profession of the Western Hemisphere to assemble here in a congress, I realize the unusual dignity of the duty I must discharge. If anything could add to the dignity of this assemblage, which for the first time asserts formally the organic union of the physicians of all America, it is the fact that the Congress of the United States, impressed with the importance of our proposed meeting, passed a joint resolution (July 18, 1892) requesting the President to extend those invitations in response to which we welcome the presence here of official delegates from all the Governments of the Western Hemisphere. In like manner are the several States of our own Union, the principal municipalities, and many of the leading educational institutions, both of North and South America, represented officially. You will not, then, think it strange that, called upon to address such an assemblage in this Columbian year, it should seem less fitting to dwell upon any technical topic than to turn our thoughts to the state of this continent and of its aboriginal inhabitants at the time of its discovery by Columbus, and to the obstacles which opposed him and the great men who completed his work. For these have had a bearing on the racial developments which have since occurred here, and should be held in mind in any estimate of the progress we have made during the subsequent four centuries. The state of medical science in Europe at the time of the discovery, and the spirit which has controlled its subsequent course, are fitly to be studied in connection with what we have accomplished during the same period and with the opportunities which present themselves to us at this time.

The recognition of the appropriateness and importance of this great meeting has been immediate and universal. International although it is, the basis of its organization and the special features which mark it remove all possible suspicion of an imitation of, or of interference with, the great International Congress whose successive meetings form a

crescendo scale of scientific and administrative triumphs which the medical profession of the world regards with justifiable pride.

Our executive committee and our efficient general secretary, to whose unselfish energy and masterly powers of organization we owe a great debt of gratitude, studiously avoided the possibility of any such interference by delaying the selection of a date for our meeting until that of the Congress at Rome was announced, and by then adopting a date which not only permitted but encouraged the presence later at Rome of those who should gather here. I can only add my deep regrets that the unhappy reappearance of cholera in southern Europe—striking example as it is of the urgent importance of the very work which calls us together—has necessitated a postponement until next spring, a postponement which, however, there is no reason to fear will lessen the complete success of the meeting on its newly announced date. The International Medical Congress is, indeed, a splendid demonstration of the solidarity of the profession and of the world-wide scope of the objects we pursue.

This congress represents much more, however, than our common interest in medical science and the common feeling of brotherhood which animates the entire profession. It is, indeed, it always has been, and forever may it so continue, the glory of the medical profession that their allegiance is one and undivided, for their service is solely in the cause of truth and humanity. Dynasties have risen and crumbled; the map of the world has been changed times almost without number, but the march of medical science through the ages has been ever onward and upward towards those lofty goals—the prevention of disease, the relief of suffering, the improvement of the race.

For us who meet here there is all of this glorious recollection and animating purpose, and there is much more to unite and to inspire us. We meet under the shadow of giant conceptions, as old as Aristotle, which agitated the minds of the great thinkers of antiquity, and were but slowly approaching a definite form when the sublime faith and genius of Columbus solved the problem of the globe.

It is true that this vast American continent, with its 16,500,000 square miles of territory, already numbers 110,000,000 inhabitants, embracing all types of human life and many varieties of political organization. But all that has yet been accomplished is but the feeble beginning of the development which awaits us. When Canning secured the recognition of the republics of South America he boasted that he had called the New World into existence to redress the balance of the Old, and yet the luminous suggestions of Franklin, of Bolivar, and of Blaine as to the political and commercial relations of the countries of the Western Hemisphere are still only prophesies which must long await their fulfillment.

The destinies of nations are slowly evolved, and occurrences which

fill the horizon of a generation appear to the broad gaze of history as mere features in the great panorama of the ages.

Even a period of four hundred years is but a fraction of the history of Spain, of France, of England. Yet four hundred years ago this entire continent was not only undiscovered and unknown, but its very existence was unsuspected save in the ingenious speculation of philosophers. We recall the familiar but ever-interesting lines of Seneca—

> Venient annis sæcula seris
> Quibus Oceanus vincula rerum
> Laxet, et ingens pateat tellus,
> Tiphys que novos detegat orbes
> Nec sit terris ultima Thule—

and do not marvel that their strain of glowing conviction should have led Columbus to write them out twice over in his "Profecias." But all the same, this New World lay shrouded in the obscurity of the great Sea of Darkness, cut off, as we have since learned, from the known inhabited world, by changes wrought in remote geologic eras, and waiting the fullness of time which should lead the inspired genius of Christopher Columbus to seek the east by sailing west. We now know that in his quest of a western passage to Asia he reached the eastern shore of this continent on October 12, 1492, but even to the time of his death, on January 20, 1506, neither did Columbus nor any voyager or writer have any conception of the vastness and real significance of his discovery. All that the geographical knowledge of the day enabled them to grasp was the belief that Columbus had found a new route to the Indies by sailing west. Within a few years, however, the daring sailors of Spain and Portugal, of Italy, and of England pushed their voyages along the coasts.

The astonishing discoveries of Americus Vespucius on his celebrated third voyage in 1501–'02, when between Lisbon and the island of South Georgia he traversed an arc of 93°, led him to apply for the first time to this continent (it really was South America of which he spoke) the title of New World (*Mundus Novus*). It concerns us not to consider further how, by no intent or design of Vespucius, portions of South America at first, and later the entire continent, came after his death to be named after him. Yet when a few days ago I held in my hands the little quarto published in 1507, in which Prof. Martin Waldseemüller, of the College of St. Dié in Lorraine, first suggests the name America, in utter ignorance that the coast explored by Vespucius was continuous with or even related to the land discovered by Columbus, I could not help smiling sadly at the frantic and fruitless efforts we make to secure immortality by our petty observations, while here Fame, in strange whimsey, threw her laurels for the greatest discovery ever made around the head of one who neither had nor preferred a claim to it.

Geology and paleontology have taught us that this so-called New

World is, in reality, in a scientific sense, better entitled to the name of the Old World. The oldest known strata have their widest development on its surface, and animals, such as the horse, which are said to have been introduced after 1492, are shown to have had their original habitat here and to have migrated hence to Europe, so that Cortes and Pizarro only reintroduced them to their former home. It is more important to recall the fact that the entire stretch of North and South America was, at that date, 1492, peopled more or less thickly with the descendants of tribes who had resided here from very remote antiquity.

A high authority assures us that the number of these aborigines was probably from twelve to fifteen millions, and in spite of considerable differences in physical appearance, as between the Iroquois of New York and the Aztecs of Mexico or the Incas of Peru in dialect and habits, it is generally conceded that this vast aboriginal population, of North America and South America alike, with the exception of the Eskimos, belonged to one great race of red men.*

In regard to the Eskimos, the polysynthetic or incorporative character of their system of word-building, in which they resemble the other aborigines of this continent, does not seem sufficient to counterbalance the marked dissimilarity in physical characteristics, and, still more, the strong chain of evidence which goes to identify them with the extinct Cave Men of Western Europe. Prof. Dawkins ("Early Man in Britain"), has especially developed this important argument. So striking is the resemblance of recent Eskimo remains to those in the Pleistocene caves of France and England, that they are pronounced by competent authorities to be indistinguishable. The extraordinary talent of the Eskimos for the artistic sketching of men and beasts is unique among savage peoples, with the single exception that among the remains of the European Cave Men many sketches, showing a similar talent, have been found. The musk-sheep, which were the inseparable attendants of the Cave Men, no longer exist save in subarctic America among the Eskimos, but the fossilized bones of these animals "lie in a regular trail across the Eastern Hemisphere, from the Pyrenees through Germany and Russia and all the vast length of Siberia."

Eskimos and Red Men alike seem to have migrated to our continent at one time, or more probably in successive waves, in the remote past, either when the northwest corner of America was joined to Siberia by the elevation of the area now known as Bering Sea, or when the lofty submarine ridge which now passes from France to Greenland was

*It is evident that the word race is used here in its broad ethnical sense. The English, the French, and the Greeks are different branches of one race from this point of view. No doubt, as John Fiske observes, "the Mexicans encountered by Cortes differed from the Iroquois encountered by Champlain as much as an Englishman differs from an Albanian or a Montenegrin," but when we are contrasting aboriginal Americans with white men or yellow men, it is right to say that Mexicans and Iroquois belong to the same great red race.

elevated so that it would be possible to travel on foot from Europe to America. If the attempt be made to decide at what period of geologic time such immigration occurred, and whether in one great migration, or, as seems most probable, in successive waves, problems of extreme if not insurmountable difficulty present themselves.

The aborigines who were living on this continent at the time of its discovery by Columbus presented, it is true, considerable differences in the stage of development they had reached, as well as in their language and even in their appearance. There are long intervals of social development evident between the squalid sty of the California savage, the long-house of the Iroquois, and the great structures of Zuñi, of Tlascala, or of Uxmal. Yet in them all can be demonstrated an underlying principle of adaptation to a certain mode of communal life such as all American aborigines are believed to have practiced.

All attempts to distinguish the existence of special races, as of the mound-builders, have broken down in the light of critical study, and the powerful arguments of philology confirm the results of zoological study as to the essential unity of the American red race. The tribes in different parts of this vast territory certainly presented marked differences in physical appearance, and our ethnological collections show that as regards size and weight of frame and shape of skull considerable variety existed among them. But all possessed the cinnamon-colored or copper-colored complexion, the high cheek bones and small, deep-set eyes, the straight black hair, with scanty or absent beard; and the conclusion of the most competent authorities is that no sufficient differences, physical, linguistic, or social, existed to invalidate the evidence in favor of the unity of the race.

Fortunately we are not called on to attempt to read the geological record. For our purpose it is indifferent whether all the relics of the ancient Americans are of the neolithic type, or whether the apparently plausible claim be ultimately established that paleolithic remains are also found in various places. This, at least, we know, that the soil and climate had shown themselves favorable to the development of a population already numerous, vigorous, hardy, and enduring, and brave and warlike, though often cruel, and evidently advancing in social development, though at very different rates at different localities. Ignorant as we are of their primitive origin, it is doubtful if the most earnest advocate of the monogenist* view that all mankind was originally descended from one pair, will urge that our aborigines were descended from a single couple, or even from a few boatloads of Asiatics accidentally carried to our Pacific coast, or that we shall hear again the

* As is well known, the tendencies of natural science are strongly towards this view. Philologists seem disposed to agree that on account of the mutability of language, especially when unwritten and while in its earlier stages, no conclusion adverse to the monogenist doctrine can be drawn from the diversities of speech now existing, or that are known to have existed at any past time.

arguments drawn from the many striking resemblances between the myths, languages, customs, or hand-wrought objects of the aboriginal Americans and of various Oriental nations. The surprise which, I am sure, all of us have experienced at these resemblances must be checked by these two thoughts, so well expressed by Fiske and by Lubbock, respectively, that one of the most important lessons impressed on us by a long study of comparative mythology is that human minds in different parts of the world, but under the influence of similar circumstances, develop similar ideas, and clothe them in similar forms of expression; and again, that different races in similar stages of development often present more features of resemblance to one another than the same race does to itself in different stages of its history.

An immense amount of sympathy has been expended upon the cruel treatment of the American aborigines by the European invaders. Of course it was the sad old story, so often repeated, whenever a better armed and more highly civilized power has come into conflict with a primitive, ignorant, and ill-armed people.

Over the ghastly picture of Indian slavery one would indeed wish to draw a veil, though its darkest shadows are relieved by the splendor of the character and labors of the illustrious Las Casas, and by the enlightened action of those great men, Emperor Charles V, Pope Paul III, and Cardinal Ximenes. But it is a romantic extravagance to deplore the destruction of any system of government or society which existed in 1492 in any part of the continent.*

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* It may not be amiss to give here a brief abstract of the ingenious method suggested by the late Lewis Morgan, of Rochester, N. Y., for gauging the real status of primitive peoples in an ethnical scale. It is obvious that any such scheme will be open to criticism, and it is not surprising that archæologists are divided as to the merits of this particular plan.

The ethnic stages, according to Morgan, are savagery, barbarism, and civilization, and in each of the lower two stages there are three subordinate periods.

The distinction between savagery and barbarism is marked by the point where the manufacture of pottery is begun. In the lower status of savagery men lived in their original restricted habitat and subsisted on fruits and nuts. Articulate speech may be supposed to have begun in this status. All existing races of men had passed beyond it at an unknown antiquity.

In the middle status of savagery men had learned how to catch fish and to use fire. My friend Dr. Lumholtz lived many months among the cannibal tribes of Australia, who are in this status. The invention of the bow and arrow marks its close.

The upper status of savagery, in which some of the lowest American tribes still continue, such as the Athabaskans, of Hudson's Bay, and the Fuegians, ends, as above stated, with the invention of pottery. Such tribes as the above know nothing of horticulture, make no pottery, and depend for subsistence entirely on bread-roots, fish, and game. They have little or no village life.

The lower status of barbarism exhibits the domestication of animals other than the dog. In 1492, except in Peru, the dog was the only animal domesticated by any of the aborigines. Indeed, the absence of domesticable animals is pointed out by Fiske as important among the causes which retarded the development of the American Indians. The horse, which is shown by fossil remains to have existed in six or

If the present state of the native Indian population in North and South America is far from satisfactory and fails to fulfill the promise shown, especially in South America during the first century after the conquest, may this not fairly be attributed to unwise legislation by the ruling nations, to the absence of continued, effective religious instruction, and to the base cupidity which has led us to promote the fatal passion for stimulants, so common among barbarous people? There seems no sufficient evidence to make us lose hope that the remains of the aboriginal Americans may, under more wise and equitable treatment, gradually develop into useful citizens of our republics and be capable of wholesome assimilation with the body of the population.

It is easy to assert and hard to disprove that the development of the red race on this continent was progressing slowing prior to 1492. As a matter of fact, we do not possess the data, either about their early history or about the primitive condition and rate of development of any of the more civilized races, to permit us to institute a comparison. Our earliest knowledge of the ancient Egyptians, for instance, reveals them living in a state of civilization already advanced at least a full ethnical period beyond that even of the Aztecs. How many centuries had elapsed while the successive stages of savagery and barbarism were passing in Egypt can never be even surmised. There seems no reason to doubt that, had America not yet been discovered,

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seven species, had become extinct, and was reintroduced by the invaders. The regular employment of tillage with irrigation, and the use of adobe brick and stone in architecture, marked the end of the lower status of barbarism in America.

The middle status of barbarism was marked in the Eastern Hemisphere by the domestication of other animals than the dog, and there, as well as in the Western Hemisphere, by the development of irrigation in cultivation, and the use of brick and stone in building, by great improvement in the manufacture of stone implements, and, ultimately, by the introduction of implements of copper or of bronze.

The middle status may be regarded as ending with the discovery of the process of smelting iron ore; and this process becomes more and more important through the upper status of barbarism, and is finally associated with the production of written records by means of a phonetic alphabet or of advanced hieroglyphics.

It is held by those who favor this classification that it renders the scientific comparative study of primitive peoples vastly easier than previously. It assigns definite meanings and boundaries for the terms savagery and barbarism, and should dispel entirely the repugnance with which the latter term has often been sentimentally regarded. It is manifestly impossible to determine in most cases the duration of the several periods above enumerated. It appears clear that certain races have passed through some of the periods more rapidly than others, and that, again, certain races have been more advanced in special points than would accord with the general level of their attainments by which their position in the ethnic scale must be determined. Among the influences which have affected the more or less rapid development of races the following suggest themselves: The conditions of soil and climate as favoring or not the acquisition of ample and varied means of sustenance; the existence or not of various animals suited for domestication, notably the horse, the sheep, and cattle; the opportunities for contact, by migration, commerce, or war, with races occupying a higher ethnic scale; inherent ethnological defects or advantages in special races.

there would have been going on here for the last four hundred years a slow and irregular approach to a higher social condition. There certainly is no doubt that during and since the conquest many sad mistakes, and not a few atrocious crimes, have been perpetrated in the name of civilization and of liberty. But, on the whole, the student of history is forced to admit the enormous advantages which have resulted from the conquest by Europeans of the fifteenth and sixteenth centuries of tribes the most advanced of which were still in a very primitive state of civilization.

I have ventured upon this rapid sketch of a familiar subject because it is well that we should be clear in our comprehension of the conditions which existed in America four hundred years ago, when the start was made to introduce the European races and civilizations. We meet here to-day to represent what these have accomplished in their new environment during these four centuries in regard to certain highly important subjects. We can not fail to be interested in considering what scientific acquisitions in these branches were actually brought here, what disadvantages were to be contended with, how far our progress may be regarded as satisfactory, what great questions there are which concern us all deeply, and in what lines of research and work we may unite for the common good and for the greater advancement of science.

The words graven on the tomb of Ferdinand Columbus in the cathedral at Seville:* "To Castille and Leon, Columbus gave a New World," are indeed true, but they do not express the whole truth. John Fiske well says: "The discovery of America may be regarded in one sense as a unique event, but it must likewise be regarded as a long and multifarious process. The unique event was the crossing of the Sea of Darkness in 1492, and no ingenuity of argument can take from Columbus and from Spain the glory of an achievement which has, and can have, no parallel in the whole career of mankind. It established a true and permanent contact between the eastern and western halves of our planet, and brought together the two streams of human life that had flowed in separate channels ever since the glacial period." But to demonstrate the magnitude of this discovery, to determine the physical features of this Western Hemisphere, to plant firmly the seeds of European civilization, demanded the heroic exertions of two full centuries. Not Spain alone, but Portugal, Italy, France, England, Holland, Denmark, Russia, played their part, and the names of Cabral and Pinzon and Magellan, of Cortes, Balboa, and Pizarro, of Ponce de Leon and Soto, of Champlain and La Salle, of Drake, Hudson, Baffin, Davis, and Bering, must remain associated forever with this stupendous and progressive work of discovery. Not until 1806 was the last step taken by Lewis and Clarke, who then succeeded in crossingthe continent of North America from east to west, and thus completed the task undertaken by Champlain in 1608. And if the mere study of the

*Á Castilla y á Leon Nuevo mundo dió Colon.

outlines and dimensions of America occupied two centuries, what are we to say of the far greater obstacles opposed to the colonization of the vast territory, and to the determination and establishment of suitable forms of government, and of harmonious relations between the numerous States and countries into which America soon came to be divided?

The older political systems of Europe seem to require still the assistance of considerable artificial support, and their occasional disturbances are of a decidedly unpleasant character. Is it strange that some of us still have our little unpleasantnesses at home or with our neighbors, which indicate that the education of our people is as yet woefully imperfect in those things that most nearly concern their welfare? Of this, at least, we may be sure, that all that promotes free intercourse among us helps on mightily the solution of these hard problems. It is a true saying that to know is to excuse, and, more than this, in regard to nations if not strictly in regard to individuals, it may be added that to know is to love. We turn with quickened interest to the sage advice of the illustrious Franklin, who, in 1749, embodied in his plan for the organization of the University of Pennsylvania an earnest advocacy of the thorough teaching of the Spanish and Portuguese tongues as likely to hasten the development of those close reciprocal relations which he foresaw would inevitably arise between the countries of the two Americas. The spirit of the age as it embodies itself in our educational systems and in our literature, the giant forces of steam and electricity, as they link together the most distant points of our territory, are working inevitably together for the enlightenment, the elevation, the better mutual understanding, and the more cordial relations of all of us.

The year whose four hundredth anniversary we now celebrate found the world stirred as never before. A work of tremendous importance for the future of the human race had been going on amid the gloom of what are often called the Dark Ages. The more closely this period of absorbing interest is studied the more do we appreciate the magnitude and the necessity of the changes effected during those centuries in preparation for the splendid activities of the Renaissance. The mission of the Middle Ages had been really, though not obviously, a cosmopolitan one, and it was fitting that the noblest achievement of the Renaissance should be the discovery of America. The barriers between nations had been lowered, and there had been going on the process of blending and interpenetration which was soon to be extended to this Western Hemisphere with such large results. The protest against mere dogma in religion and in philosophy; the revolt against usurped and abused absolutism; the demand for light and knowledge and the common rights of humanity, these awakened then to be stifled no more, but to swell forever in larger utterance until they shall, in some yet distant golden time, announce universal liberty under equitable laws and universal peace through arbitration. It is not for us to taunt the glowing expectations of the men of 1492 with their long-postponed fulfillment.

It ill becomes us of to-day to speak in other than tones of humility when across the brightest spots of the vaunted civilization of the close of the nineteenth century after Christ there still fall so many dark shadows lingering from the deep mediæval night.

How each generation turns aside with the restless impatience of children from the lessons of the past, and shuts its eyes to the truth which inexorable history calmly shows, that long periods of time are required for the accomplishment of each great advance in religious, or political, or social, or scientific truth.

Yet, though we smile somewhat sadly as we read the bursts of enthusiasm so plentiful at that time, we dare not challenge the fitness of that grand name, the Renaissance, to the age which, through its mighty discoveries and the master minds who used them, diffused among the nations the new conceptions of the earth and the skies, of the church and the state. Only the pity of it that such long centuries of travail must ensue between this implanting of the seed of religious and political liberty and the mature growth for which we still wait.

In no respect may the discovery of America be regarded as the dividing line between the Middle Ages and the Modern Era more truly than in regard to medical science. In spite of the prodigious learning of the most distinguished Arabian and Jewish physicians, such as Avicenna, the prince of physicians, of Albucasis, of Avenzoar, the wise and illustrious, of Maimonides, their medical science was far too largely speculative and philosophic. Great universities were established, some of which, as those of Bagdad and of Cordova, possessed regal revenues and magnificent libraries. Numerous hospitals were founded, of which the large and wealthy one established at Cairo in 1283 merits special mention.* But the outcome of this long dominion of the Arabs and the Moors, so far as concerns medical science, was merely a marked advance in chemistry and pharmacy, the introduction of many new remedies, and the advocacy of the union of the natural sciences with medicine. Their chemistry was tinctured strongly with alchemy, their clinical teaching was elementary, their diagnosis and treatment lacked the true Hippocratic force and directness.

The endless speculations and metaphysical discussions of the schools had shown that it was not that way true progress lay. Unaided observation had scarcely gone further in eighteen hundred years than the point to which the immortal Hippocrates had carried it.

True medical science, which could not progress without precise methods and instruments of precision, was forced to wait until from very different quarters came the development of the natural sciences and the era of exact experimentation, which alone rendered them possible. Harvey's immortal discovery of the circulation of the blood was

* The first hospitals, in our sense of the term, were probably founded about 335 A. D. by Helena, the mother of Constantine, at Constantinople and Jerusalem. That at Antioch was founded in 360, and the famous Basilides Hospital at Cæsarea in 373.

not announced until 1616, and his almost equally important and epoch-making discovery of the origin of the higher animals from the egg was published in 1651; yet it may be safely asserted that the work of this modest and truly scientific Englishman did more to advance medicine than all the labors of all the schools from the days of Hippocrates. Not only were the facts demonstrated of infinite importance, but his method of patient, exact observation and experimentation until the truth was developed by cautious induction marks the introduction of a new era, and stamps Harvey as the father of modern medicine.

Galileo first indicated the use of the thermometer in medicine about 1595. Sagredo, of Venice, improved it in 1613, and Sanctorius, in 1625, urged its importance in the study of disease forcibly, but as yet ineffectually, and the last half of the present century is reached before the classic work of Wunderlich placed medical thermometry on an enduring basis of practical value. Just as the astronomer, Galileo, gave us the first rude thermometer, Kepler, another illustrious astronomer, gave, in 1604, the first record of an accurate count of the human pulse. But so slowly did the importance of this datum in the study of disease impress the medical profession that the acute Sydenham, who lived until 1689, nowhere mentions a single pulse count. It is hard to find anything which illustrates better the radical difference between the spirit of mediæval and of modern medicine than the vast mass of obsolete literature upon the pulse, loaded with fanciful speculation and super-refined subtleties of description, and yet wholly deficient in the only features which would give practical value to the study. What progress in exact medicine could be made without chemistry? Yet scarcely any development in this branch occurred between the eighth and seventeenth centuries. And it was Boyle, the father of modern chemistry (not born until 1627; died 1691), who first succeeded in freeing from the trammels of alchemy this noble science. Not until the end of the seventeenth century did the value of quantitative analysis begin to be appreciated. Lastly, it was not until 1590 that we hear of the first compound microscope in the hands of Jansen.

Meanwhile the gross superstitions, combined with a blind dependence on the great authorities of antiquity, and especially on Aristotle and Galen, which had so long dominated medical science, yielded slowly to the growing light of positive knowledge. Fine-spun subtleties, drawn from metaphysical speculation; the fantastic notions of alchemy and astrology; the rank growth of impostures which flourished in the soil of ignorance, and the bigotry which placed every organ under the charge of a special saint and conjoined with every remedy a special form of supplication, still marked medical teaching and medical practice.

But the bold, fearless, investigating spirit of the sixteenth century did its work for medicine as it did for other great matters. Vesalius (1514–1564) and his contemporaries created accurate anatomy. Paré (1509–1590) stamped imperishably on surgery the influence of his genius

and lofty character. Paracelsus (1493–1541) hurled the shafts of ridicule and invective against the groveling subserviency to ancient authority, and did a rough but important stroke of work toward the emancipation of the medical mind. The grand old Hippocratic method of careful observation and cautious reasoning was reasserted, the unproductive philosophy of Galen and his Arabian worshipers was discarded, and at last there begins to emerge from the darkness of so many centuries modern medicine, the medicine of loyalty to Nature and revolt against mere human authority; of reverent skepticism and reasonable faith; the medicine of scientific experimentation and of humane vivisection, that insists upon knowing the causes of disease and that looks to hygiene as its noblest expression.

The history of European medicine for more than three hundred years is a record of which we may well be proud, when the enormous obstacles to progress are held in view. It is not necessary to remind this audience of a single one of its great triumphs. Vesalius and Paré, Harvey and Sydenham, connect themselves with Bichat and Laennec, and Hunter and Jenner, and Pasteur and Lister, and Virchow and Koch, and the torch of genius is passed down the line of these immortals and lights up the ages with the splendor of their achievements. But it is sad to reflect upon what has been done as contrasted with what might have been. The dense ignorance of rulers and masses on scientific questions, the slow progress of sound, useful education among the people, the huge claims of imperialism and of militarism, the wanton waste of luxury, have retarded research, have left but paltry sums available for the diffusion of knowledge, have hindered the embodiment in legislation and in actuality of much that would help the healing of the nations. It is an odd commentary on the vaunted civilization of to-day to contrast the sums doled out by the most enlightened governments of Europe for the promotion of higher education and orginal research or for the suppression of preventable diseases with those lavished on the vast hosts of armed men and the huge fleets of unwieldy armored ships deemed necessary for the maintenance of peace and order.

Within our own day we have seen the announcement of the grandest generalization reached by the human mind, in this century at least, and advanced in the most philosophic and inoffensive manner, received with a burst of intellectual skepticism and of religious intolerance which showed that the old forces against which the Renaissance protested, and still protests, are yet alive, though happily shorn of most of their power. The marvelously rapid spread of the illuminating doctrines of Darwin, and their incorporation in the thought and speech of the world and in the teachings of the churches, may indeed be pointed to as the crowning intellectual achievement of the nineteenth century.*

*The grave of Harvey, in Hempstead Church, bears a plate which gives his birth April 1, 1578; his death June 3, 1657. His immortal work, Exercitatio Anatomica de Motu Cordis et Sanguinis, was unable to pass the censorship of the press in

If the actual progress of medical science was slow in Europe during the years which followed that *annus mirabilis*, 1492, surely no word of reproach may be uttered against the early settlers in North and South America because, amidst their heroic efforts to conquer this vast continent, it was long before they found time or energy to devote to the cultivation of that practical and essential subject of medical science.* It is true that in 1551 Charles V founded the University of Lima, in Peru, and in 1553 the University of Mexico. Yet it does not appear that medicine was taught at these universities until a little prior to 1700.†

In North America, although Harvard College was founded in 1636, the title of university seems to have first been applied to the University of Pennsylvania, which in 1765 established the first school of medicine in the United States. The scattered handfuls of early settlers on our shores had, indeed, problems facing them more urgent than the promotion of science. They differed as widely in their motives for undertaking the appalling task of conquering and colonizing America, and in their fitness for the work, as they did in their nationalities. Separated widely from the mother countries, hampered very often by unwise and vexatious interference from the home governments, they waged war against the powerful tribes of aborigines who swarmed over the country and against the no less serious obstacles of untried climatic and political conditions. Bloody warfare raged promiscuously, and disease was rife. We have seen that the work of mere preliminary exploration occupied two centuries. The close of the third century found the early struggles approaching a successful ending, only to be followed by violent political changes, not accomplished save by long and costly wars. The English conquest of Canada, in 1759–'60, the achievement of independence by the United States in 1783, the establishment of the independence of the South American republics in 1810 and the ensuing twenty years—these are the events from which the future historian will date the renaissance or the decadence in America, and to which reference will always be made in estimating our capacity for progress in politics, in literature, in art, and in science.

For a long time it seemed even to friendly critics that the new races

England, and appeared (in his 50th year), in 1628, at Frankfort-on-the-Main. Although susceptible of easy demonstration, this epoch-making discovery failed for years to influence medical thought or practice. Darwin rests in Westminster Abbey, with the sovereigns, the statesmen, and the warriors of a proud people. The inscription, "Born February 12, 1809; died April 19, 1882," is to be taken in connection with the fact that his chief work, "On the Origin of Species," published in 1859, in his 50th year, was, during his lifetime, translated into all modern languges, and reached in England itself six editions and 72,000 copies.

*The first printing press in North America is said to have been set up in 1639, in the house of President Dunster, of Harvard College.

†Dr. Billings tells me there is on record a complaint of the want of a cadaver at the University of Mexico to read the lessons of anatomy over.

which strove for a foothold on American soil were unlikely to thrive as vigorously as in their accustomed habitats, and the impossibility of developing a genuine and lasting American type was freely asserted. To those of us who have considered this point with anxious care the last two decades have brought results that put to rest all apprehension. Whatever may be the future changes in the political organization or relations of the countries composing America, it is a demonstrated fact that the European race in America, which already numbers over 100,000,000, will show no decline in vigor or in energy, in physical or in mental strength. It is not on account of mere bigness in material achievement that we point to the millions who fought in the great civil war; or to the 170,000 miles of railroad in the United States—almost as much as in all the world besides, and the $10,000,000,000 of capital invested, and the army of 900,000 employés; or to that tremendous structure, the Canadian Pacific Railroad; or to the plans now under consideration for developing a continous railway system for the entire continent, from Montreal or Puget's Sound to Bueno Ayres. It is, even more, as evidences of large imagination, of courageous resolution and dauntless tenacity of purpose, and of enormous power of physical endurance that we value the enterprises which have subjugated this continent so swiftly and are hastening its commercial consolidation. We may be assured that countries which have shown such sturdy love of independence and resistance to outside interference, which have displayed so much sagacity in adapting their political constitutions to their peculiar conditions, which liberate and enfranchise all who dwell within their limits and afford to all an equal chance of advancement, will work out their destinies to far larger and wiser plans of friendly cooperation than we can now foresee.

Turgot, in his memorable address in the Sorbonne, well declared, "Tous les ages sont enchainés par une suite de causes et d'effets qui lient l'état du monde à tous ceux que l'ont précédé." The discovery of America depended on the operation of causes which can be traced back many centuries. The present condition of our continent, four hundred years later, is the result of the action and reaction of mighty movements which involve every country of the world. Here is the new and probably the last great place of gathering and intermixture of all nations. Here as nowhere else are to be studied with all the aids of exact science the problems of ethnology and sociology.* Here are to

* It was on this account that I was so anxious for the organization of the American Anthropometric Society, which was happily established in 1891. The interaction between functional activity and cerebral development is attested by so many facts, and the methods of examining and recording the exact arrangement and minute structure of the nervous centers are so securely established, that the time seems to have come to begin, upon a broad and systematic basis, the study of the progressive anatomical changes effected in successive generations of individuals subjected to the stimulating and rapidly changing environment presented by our modern life. The full members of this society engage to direct that a post-mortem examination

be worked out to the best advantage the problems concerning the relations of man to his physical environment; and the demonstration that in spite of the apparent magnitude of the powers of nature, and in spite of the admitted influence of climate and physical condition upon the progress of civilization, the powers of man for intellectual and social advancement are incalculably superior.

In all of this work a large share must devolve upon medical men, and fortunately our position in America is one which will enable us to work together with good effect. The high average intelligence of our people will make them prompt to appreciate results of solid utility or scientific value. The enormous wealth, present and prospective, of this continent should readily be diverted more and more bountifully to the promotion of learning and research—if, as may be trusted, we shall strive more and more after peace among ourselves and abroad.

We shall never cease to be proud of our lineage, or to acknowledge the immense debt we owe to Europe. Its languages are ours; its glorious past is part of our heritage; its mighty names in art and philosophy and science are household words with us. Its rapidly advancing civilization incites us to loftier efforts. But the balance between the Old and the New Worlds is being redressed.

All know how the examples of our young and vigorous communities have supplied and fed the infectious principles of political liberty and social equality.* In every struggle for the rights of man, from the terrible but beneficent drama of the French Revolution down to the present hour, our example and our assistance have been invoked.

I can not detain you by an enumeration of the services already rendered by America to medical science. Almost immediately after the discovery important contributions to pharmacology were announced,

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of the brain shall be permitted. The other members make no such pledge, but all are concerned in the promotion of anthropometric and ethnological research. The scope of the work undertaken by the society is very broad and profoundly important. It is believed that nowhere else can its investigations be so profitably prosecuted as in America. The organization is, however, essentially international in character. It is difficult to overestimate the value of a large series of exact portraits of the brain, in its macroscopic and microscopic features, obtained in successive generations during even so short a period as a thousand years. These records will be obtained from members of different races living under similar and under widely different physical conditions; and it is hoped to secure such records from many successive generations of a number of individual families whose intelligent interest in such collective investigations may be sufficiently maintained. The good work of this society is already actively progressing. The records will be preserved in the strictly fireproof buildings of the library and of the Wistar Institute of Anatomy and Biology connected with the University of Pennsylvania. Doubtless the medical profession of all America will be prompt to help, from their technical standpoint, the great work in ethnology and archæology upon which all Americanists are now so vigorously entering.

*This is the only infectious principle we have communicated. The fable which assigned an American origin for European siphilis has been refuted by conclusive evidence from many sources.

chiefly from South America, and from the introduction of guaiacum, in 1508, until now these contributions have become more and more frequent. The entire medical world was agitated during the latter half of the seventeenth century by the struggle over the merits of cinchona bark,* introduced into Europe, in 1640, by Juan del Vego, and no more convincing tribute can be adduced as to the value of medical and sanitary science than the prominent place occupied by malarial diseases in the general and medical literature of the seventeenth and eighteenth centuries as contrasted with the feeling of impunity with which they are now regarded. Among the results which may be anticipated from this meeting is, I trust, the adoption of some well-considered plan for systematic conjoint study of our American remedies and their pharmaceutical preparations, looking to their scientific classification, to greater uniformity in their preparation, and ultimately to a single pharmacopœia for the entire continent.

The introduction of nitrous oxide (1844) and of ether (1846) into medical practice, with which the names of Wells and of Morton are so honorably connected; the establishment of the operation of ovariotomy by McDowell, of Kentucky, upon a secure scientific basis—these and hundreds of other achievements of lesser brilliance are too familiar to need mention. Every one knows now how superfluous it is to say a word in defense of American literature, and certainly we who know how powerfully the opinions and practice of medical men in Europe and throughout the world are influenced by American writings may view our position with some complacency. Yet a survey of what America is actually contributing to medical literature shows clearly how far we are behind the nations which lead in medical thought. In the year 1879 Rupprecht's Bibliotheca † gave as the total number of new medical books, excluding pamphlets, periodicals, and transactions, 419, divided as follows, viz: France, 187; Germany, 110; England, 43; Italy, 32; United States, 21; all others, 26; and for 1891 I find the same Bibliotheca gives the total number as 1,063, divided as follows, viz: Germany, 360; France, 243; Great Britain, 141; United States, 80; Italy, 78; Austro-Hungary, 70; Spain, 24; other countries (chiefly Switzerland and Denmark), 67.

On the other hand, in the more ephemeral forms of medical literature the figures are very different. I have had a careful count made of the volumes of medical journals and transactions filed in the library

* The motives influencing its opponents were borrowed in part from the doctrine of qualities of the ancients, in part from the hatred of the Jesuits, who were especially active in extending the use of the drug, and in part, as malicious tradition asserts, from the fear that it would cure so speedily as to render the earnings of physicians precarious. One is reminded of the old Indian proverb: "Various are the desires of men; the wagoner longs for wood, the doctor for diseases."

† J. S. Billings, M. D., "Our Medical Literature." Address before the International Medical Congress, 1881. He adds that these figures are too small, and especially so as regards Great Britain and the United States.

of the Army Medical Museum at Washington, with their respective places of publication,* and from this it is clear that of these classes of medical literature there were, in 1890 and in 1891, published in America (including Canada, the United States, and Latin-America) about twice as many volumes as in Germany or France, and fully three times as many as in Great Britain.

	Totals.		America, including Canada, United States, and Latin-America.		Germany.		France.		Great Britain and dependencies, not including Canada.	
	1890.	1891.	1890.	1891.	1890.	1891.	1890.	1891.	1890.	1891.
Number of volumes of journals	985	1,021	278	297	159	168	153	160	81	87
Number of volumes of transactions	319	300	104	84	48	48	35	38	36	33

	Italy.		Spain.		Austro-Hungary.		Belgium.		Other countries.	
	1890.	1891.	1890.	1891.	1890.	1891.	1890.	1891.	1890.	1891.
Number of volumes of journals	106	103	36	37	39	38	23	21	110	110
Number of volumes of transactions	27	27	1	1	4	6	10	10	54	52

Of course we must not forget the fact that in the hurry of our life of to-day many observations and investigations of great value are published in journals, instead of being reserved to become part of more serious and complete volumes. But it will not be doubted, I think, that the great excess of medical journals in America, as contrasted with the comparatively small number of new medical works, is entirely consistent with the admitted leadership of Germany, France, and Great Britain in medical science. The fact that during the past twelve years Germany has risen from a place in this list second to France, 110 as against 187 in 1879, to the first place at present, with 360 new medical works in 1891 as against 243 published in France, speaks eloquently of the strenuous effort with which newly united Germany is straining forward in science as in other fields. The truth is that the apparently extraordinary number of medical journals in America is due chiefly to a substantial reason, and one which influences equally the existence of very numerous medical schools and medical societies. The vast extent of territory and the relatively sparse population render it impossible to serve the country with as low an average of medical men, schools, societies, or journals as is possible in more densely populated countries.

As to other and less satisfactory reasons which have operated, especially in the United States, to produce a great growth of ill-equipped

* It gives me pleasure to acknowledge the assistance rendered in the preparation of these interesting statistics by the National Bureau of Medical Bibliography. This admirable enterprise, established at Washington so as to have immediate access to the great library of the Surgeon-General's Office, merits the appreciative support of the profession.

medical schools and of poorly-supported medical journals it is not necessary to speak here. Indeed, the rapid rise in the standard of scientific requirements, both of medical men and medical literature, and the increasing appreciation on all sides of the fact that the higher medical education is the true interest both of the profession and of the public is accomplishing the much-needed work of checking the ill-considered establishment of new medical enterprises, and of stimulating those in existence to more earnest life and more lofty aims. So true is this in regard to our medical journals in particular that no one who has occasion to consult regularly the files of any number of them can fail to have been struck forcibly with the steady and decided improvement in the tone of their management and in the scientific quality of their contents.

This Congress meets at a period of peculiar and critical interest in medical education, and I am glad to say that for the first time in the medical history of the United States we may feel proud to have such a meeting convened here, and to invite a close examination of our educational standards and facilities. I should fail in courtesy and in candor alike were I not to acknowledge the great value of the example which has been so consistently set by Latin America and by Canada in the maintenance of a high standard of qualifications for medical practitioners.

Fifteen years ago the medical profession of the United States arraigned severely the management of their overnumerous medical schools.* While Canada then exacted a reasonably strict entrance examination and a course of medical study extending over four years, with one session of six months in each year, and while every country in Latin-America exacted a collegiate degree or a rigid entrance examination and a course of medical study extending over six years, it was the general custom with the medical schools of the United States to grant a diploma conveying the full right to practice medicine to applicants who had been admitted without preliminary examination and had attended without term examinations two courses of lectures covering about five months and had passed a single and final examination conducted by their own teachers, whose emoluments were derived solely from the fees of such students. This discreditable prostitution of a great educational trust had been gradually brought about by large causes upon which I may not now comment. But it is with justifiable pride that we may point to the admirable and sweeping reforms that have since been instituted. It remains true that the laws of many of the States allow charters for medical schools to be secured without any guarantee of the standard of education that shall be maintained. But the awakened sentiment of the profession and of the community has in a rapidly increasing number of the States insisted that medical graduates before being admitted to practice shall pass a State examination

* Regular schools, 65; homeopathic, 11; eclectic, 4; total, 80, in 1877.

conducted by an impartial board of examiners appointed by the governor. The medical schools, to their honor be it proclaimed, have, with few exceptions, been foremost in the struggle to secure this wise and beneficent legislation. They have done much more. In advance of these laws which will insure a far higher standard of medical qualifications in the States fortunate enough to be so protected, the faculties of a number of the leading schools have forced their standard up at first to three years of obligatory study, and now to four years of eight months' study each, with a carefully graded curriculum and with strict examinations before entrance, at the close of each term, and finally before graduation.

When we recall that this has been done without the slightest governmental aid, and, further, that owing to the prevalent view that medical schools have been sources of large profit to their faculties the streams of private benefaction had not yet been directed in their favor, you will appreciate the high sense of duty and the devotion to science which have led these faculties to assume greatly increased labors with an expectation of considerably diminished remuneration owing to reduced attendance of students and to augmented expenditures.

The committee of arrangements of this congress has wisely provided for a tour of inspection of some of these institutions. It is trusted that all of our foreign delegates, and as many as possible of the members of this congress, will avail themselves of this opportunity to examine the equipment of some of our leading medical schools. They will be gratified to find, in hospitals, in laboratories, and in libraries and museums alike, facilities which bear comparison with those of Europe. They will find an arrangement of studies, and, above all, an organization for the conduct of daily thorough bedside instruction in all branches of medicine, which leave little to be desired. It is easy to foresee, as another of the desirable results of such meetings as this held successively in various parts of America, such increased acquaintance with and confidence in our respective methods of medical education and medical treatment as will retain on our continent many of our students and many of our invalids who have been in the habit of going farther to fare no better.

A broad field opens before us for the study, with the aid of collective investigation, of the distribution and course of phthisis and rheumatism and other important diseases as influenced by race and locality. The endemic fevers, other than malarial and typhoid and yellow fever, which are said to prevail in various parts of North and South America, have long demanded systematic investigation to complete the study which the illustrious Drake began. We shall now have the opportunity of studying, equally by means of collective investigation, the relative effects of various climates on the numerous races now represented in America, and of determining more accurately the scientific and practical

questions connected with our extensive series of health resorts which embrace the finest examples of every type.

There are, indeed, none of the sections provided for in this congress from whose work more valuable results should follow than from those on medical pedagogies, on hygiene and climatology, and on quarantine. It was a sense of the urgent importance of these latter subjects, especially at the present time, and of the valuable results sure to follow their consideration by such a body as this, which led the Government of the United States to extend the cordial invitation which has been uniformly accepted on the part of the Pan-American Governments. I feel that by this action there has been secured for the subject of hygiene and State preventive medicine a formal recognition never before accorded on this continent, and one which must surely be followed by the willingness of the respective governments to use their influence to secure the enactment and efficient administration of proper legislation in accordance with the recommendations of this body of eminent experts.

When the International Medical Congress met in Philadelphia in 1876, the address on Hygiene and Preventive Medicine, delivered by the distinguished Bowditch, himself a pioneer in sanitary science, was one of the most impressive utterances on that important occasion. The review there given of the work of the previous century in this country in sanitary science was not flattering, but with the fine enthusiasm which marked that gifted man he predicted the immediate opening of the grandest epoch yet seen in the history of medicine. His closing appeal must be quoted. "Our present duty is organization, national, State, municipal, and village. From the highest place in the national council down to the smallest village board of health we need organization. With these organizations we can study and often prevent disease." These stirring words were in accord with the spirit of the times and with the developments of science.

When the brilliant discoveries of Koch brought to light the specific bacillus of tuberculosis and of cholera, and pointed out the scientific method to be pursued in similar investigations in the future, an unanswerable argument was provided against skepticism or indifferentism or official penuriousness. It required courage and showed rare breadth of view in Lord Palmerston to issue his celebrated reply to the Presbytery of Edinburgh on the occasion of the threatened outbreak of cholera in 1853, in which he urged that the weal or woe of mankind so far depends upon the observance or neglect of the natural laws by which the affairs of the world are regulated, that if the local causes of disease were not removed before the return of the hot weather, the pestilence would be sure to return in spite of all the prayers and fastings of a united but inactive nation.

Much was accomplished, it is true, in preventive medicine between 1853 and 1876, when Bowditch spoke; but it is scarcely an exaggeration to say that the progress in the past twenty years has been greater

than in the preceding twenty centuries. We have not, indeed, yet detected the specific poison of every infectious disease; even in regard to the familiar and much studied yellow fever the latest publication of the distinguished Surgeon-General of the U. S. Army shows that this point is still unsettled. But the position of the whole matter is changed radically. Hypotheses have given way to facts. Everyone now knows, or ought to know, that the most dreadful diseases are inseperably connected with definite organisms, that these organisms have special laws of development and distribution, that to destroy or exclude them is to avoid the disease, and that to tolerate conditions which favor their development is to encourage and invite the attack of the disease. When these simple, demonstrable propositions are considered in connection with such scourges as cholera and yellow fever, and typhus and typhoid fever, and scarlatina and diphtheria, and epidemic meningitis, it needs no further argument to prove the value and the necessity of quarantine, and of efficient medical inspection and protection. Nor does it need further argument to show the wisdom of establishing laboratories of hygiene at many points over the country, of equipping them amply with the ablest men and the finest apparatus, and of endowing them liberally, so that the search after the yet unknown causes of disease, and after the best methods to prevent the development of such causes as are known, may be prosecuted with ceaseless vigor.

It is easy now to get a hearing for these views, when public comfort is disturbed, the public purse threatened, and the public conscience awake and sensitive. At this moment our great commercial communities are reposing in confidence upon the sanitary measures adopted by our governments, in accordance with medical advice, for the restriction and exclusion of two dreaded pestilences, cholera and yellow fever. Recall with me the popular terror of last summer. Recall the hideous loss of life and the disastrous effects on commerce caused by former invasions of these diseases when the communities afflicted were smaller and less wealthy than are ours at present. We do not have to seek back to the Middle Ages for pictures of desolation wrought by infectious disease. Recall that tragic story of the great yellow fever epidemic in Philadelphia just one hundred years ago, as told by Rush. Try to estimate the result if cholera had effected a lodgment in New York City in July, 1892, and having found favoring local and climatic conditions, had, as on former occasions, spread its deadly germs to the North and South and West. The fair White City that was rising by that distant lake, under the magic wands of Art and Industry, would have been stricken with a fatal blow. No computation can well exceed the loss that would have fallen on this country. The entire people gazed with bated breath at the struggle waging in New York Harbor, and universal thanksgiving arose when the dread invader was finally repulsed by the vigorous and sustained efforts of the

sanitary authorities. That we in America are not to-day witnessing the aggravated recurrence of the epidemic, in accordance with unvarying precedent, can be due only to the continuance of these same efforts, reinforced with large authority, and aided by more efficient local sanitation. When this gratifying result is associated with the success which for some years has attended our efforts for the exclusion of yellow fever, no further argument can be needed to urge the adoption of such uniform measures as will for the future afford most sure protection against these diseases. These instances exhibit in the most striking manner the need and the value of the international sanitary agreements this Congress may do much to promote.

But there will occur to all of us many other important questions to be solved only by earnest and united work. Nor can this work be accomplished until Bowditch's cry for organization is far more fully answered than it yet has been. Nothing but organization and cooperation, and, yet more, the establishment in the government of every civilized nation of a department of public health, will secure the continuous and forcible attention which the magnitude of this enterprise demands. There should be, and the day can not be far distant when there shall be, in the cabinet of every government here represented a secretary of public health, of rank, influence, and prerogative equal to that of any other cabinet officer.

Here, then, is the last and greatest service to be rendered to science and to the nation by our Congress. Our combined influence will be irresistible when used in advocacy of higher education; in carrying out large plans for the scientific study of our national life, as affected by social and climatic influences; in the adoption of remedies and remedial measures of demonstrated merit, and in the insistence upon a fuller recognition of the lofty function of preventive medicine. "Salas Sanitasque Republicæ, suprema lex." Let us acquire here a closer touch with each other, a deeper faith in our profession and its noble destiny, and a stronger determination to labor in brotherly cooperation for the loftiest ideals of service to science and the race.*

* It would be improper to omit an acknowledgment of the free use that has been made in the preparation of this address of various authorities. Especially must be mentioned Fiske's Discovery of America; Baas's History of Medicine (translated by Handerson, 1889); The Discovery of North America, by Henry Harrisse (Paris and London, 1892); The History of the New World called America, by E. T. Payne (Vol. I, Oxford, 1892); Buckle's History of Civilization in England; Draper's History of the Intellectual Development of Europe; Fisher's Outlines of Universal History; The Early History of Instrumental Precision in Medicine, by S. Weir Mitchell, M. D.; Historia Bibliográphica de la Medicine Española, by A. H. Morejon; Publications and Unpublished Letters of Dr. Daniel G. Brinton; Report on the Etiology and Prevention of Yellow Fever, by George M. Sternberg, 1890 (now Surgeon-General U. S. A.); Lubbock's Origin of Civilization, and also Prehistoric Times; Tylor's Anthropology, and also, Researches into the Early History of Mankind; Lewis Morgan, Ancient Society, New York, 1877.

It gives me much pleasure to acknowledge also the assistance received from Dr. R. P. Robins, especially in the examination of the History of Early Spanish Medicine.

SESIÓN DE LA TARDE.

SETIEMBRE 6 DE 1894.

DISCURSO INAUGURAL PRONUNCIADO EN EL SALÓN METZEROTT POR EL PRESIDENTE DEL CONGRESO, PROFESOR GUILLERMO PEPPER.

SEÑORES DEL PRIMER CONGRESO MÉDICO PAN-AMERICANO: Esta ocasión es sin igual; por lo tanto estoy convencido que las ideas que se agolpan en la mente de todos son tan idénticas, que la alocución mas corta sería el discurso más adecuado; pero cuando reflexiono que me encuentro aquí para representar la resolución unánime adoptada el día 5 de mayo de 1891 por la Junta de la Asociación Médica Americana, y que esta resolución fué que se hiciese invitación cordial á la profesión médica del Hemisferio Occidental para que se reuniese aquí en Congreso Médico, entonces comprendo el alto deber que tengo el honor de cumplir. Si algo pudiera añadirse á la distinción de esta asamblea, que por primera vez afirma formalmente la unión orgánica de los médicos de todas las Américas, es el hecho de que el Congreso de los Estados Unidos, movido de la importancia de nuestra proyectada reunión, tomó la resolución unánime, el día 18 de julio de 1892, de suplicar al Presidente de la Nación que llevase á efecto esas invitaciones; por cuyo motivo tenemos el honor de dar la bienvenida aquí á todos los delegados oficiales del Hemisferio del Occidente. Igualmente están representados aquí varios de los Estados de nuestra Unión, los municipios más importantes y muchas de las instituciones docentes de la América del Norte y del Sur. Espero, pues, que no os parecerá extraño que, llamado á dirigiros la palabra en este año Colombino, elija como tema técnico llevar nuestros pensamientos al estado de este continente y de sus habitantes primitivos en la época del descubrimiento, por Colón; á los obstáculos que se le opusieron, y á los grandes hombres que completaron su obra; puesto que estos últimos han tenido una influencia sobre el desarrollo de las razas que después se han formado aquí, y que deben tomarse en consideración cuando estimamos el progreso que hemos hecho durante cuatro siglos consecutivos. El estado de la ciencia médica en Europa en la época del descubrimiento, y el espíritu que ha influido en su curso subsecuente, deben ser también estudiados en conexión con lo que hemos nosotros hecho durante el mismo período, contando con las oportunidades que se nos ofrecen en los tiempos que alcanzamos.

El reconocimiento de la importancia de esta reunión ha sido cosa inmediata y universal; y si bien internacional, sus bases de organización y sus caracteres especiales hacen desaparecer toda sospecha de una imitación ó de una intervención con el gran Congreso Internacional cuyas reuniones sucesivas forman una escala creciente de triunfos

científicos y administrativos que la profesión médica del universo admira con un orgullo justificado.

Nuestra Junta de Gobierno y nuestro Secretario General, con quienes, por su energía y dotes especiales de organización, hemos contraído una deuda de gratitud, no queriendo producir el más leve obstáculo al buen éxito del Congreso de Roma, no decidió fecha alguna hasta no saber cuando se efectuaría éste, y entonces escogió una que, no tan solamente permitiría, sino que facilitaría mas tarde la presencia en Roma de los que asistiesen al nuestro. Deploro que la triste reaparición del cólera en la parte sur de Europa—sorprendente ejemplo de la importancia del fin que nos llama aquí á reunirnos—ha necesitado diferir la fecha del Congreso hasta la primavera entrante, cuya demora es de esperarse que no afectará la importancia ni el buen éxito de la reunión. El Congreso Internacional de Médicos es, en realidad, una demostración brillante de la solidaridad de la profesión, y del fin universal á que tendemos.

Este Congreso, sin embargo, representa mucho más que el interés común en las ciencias médicas y el afecto fraternal que anima á nuestra profesión en general. La gloria de la profesión médica ha sido, y será siempre, su unión estrecha é indivisible, puesto que su servicio tiene por objeto la causa de la verdad y de la humanidad. Han subido y han caído desmoronadas las dinastías; el mapa del mundo ha sido cambiado una infinidad de veces; pero la marcha de las ciencias médicas durante todas las épocas ha sido una ascensión constante á las altas aspiraciones de prevenir las enfermedades, aliviar á los que sufren y mejorar las razas.

Nosotros los que nos reunimos aquí tenemos para animarnos todos esos gloriosos recuerdos y hay más aún para unirnos é inspirarnos. Nos reunimos debajo de la sombra de una concepción gigantesca, tan antigua como Aristóteles, que agitó la mente de los grandes hombres de la antigüedad, y que lentamente se acercaba á una forma definida cuando la fé sublime y el genio de Colón resolvieron el problema del globo.

Verdad es que este vasto continente americano, que tiene seis millones quinientas millas cuadradas de territorio, ya contiene ciento diez millones de habitantes; que abraza todos los tipos de la vida humana y muchas variedades de las organizaciones políticas. Pero todo lo que hasta ahora ha sido hecho no es más que un tenue principio de lo que nos espera. Cuando Canning optuvo el reconocimiento de las Repúblicas de la América del Sur, se jactaba de que había llevado el Nuevo Mundo á una existencia en que pudiese corregir las faltas del Antiguo; y sin embargo las luminosas proposiciones de Franklin, de Bolívar y de Blaine en cuanto á las relaciones comerciales de los países del Hemisferio Occidental son aún solamente profecías que tardarán mucho para verse realizadas.

Los destinos de las naciones se desenvuelven lentamente; sucesos que ocupan todo el horizonte de una generación resplandecen á la

faz de la historia como pequeñas pinceladas en el gran panorama de los siglos.

El curso de cuatrocientos años no es sino una fracción de la historia de España, Francia é Inglaterra; y sin embargo, hace cuatrocientos años que este continente entero no solamente no se había descubierto y era desconocido, sino que ni siquiera se sospechaba su existencia, á no ser en las ingeniosas especulaciones de los filósofos. Recuerdo los muy conocidos versos de Séneca:

Venient annis sæcula seris
Quibus Oceanus vincula rerum
Laxet, et ingens pateat tellus,
Tiphysque novos detegat orbes,
Nec sit terris ultima Thule—

y no me sorprende que sus convicciones vehementes indujeran á Colón á transcribirlos dos veces en sus profecías; pero sin embargo, este Nuevo Mundo estaba aún envuelto en el manto oscuro de lo desconocido, desgarrado, como hemos podido saber después, del mundo conocido, por cambios producidos en remotas eras geológicas, esperando el plazo en que la inspiración y el genio de Cristóbal Colón le indujeran á buscar el Oriente navegando hacia Occidente. Ahora sabemos que buscando un derrotero al oeste hacia el Asia, llegó á las playas de este continente el día 12 de octubre de 1492; pero aún en la hora de su muerte, el día 20 de enero de 1506, ni Colón ni ningún otro navegante ó escritor tenía una idea de la magnitud de su descubrimiento. Todo lo que los conocimientos geográficos de aquella época les permitían comprender era que Colón había encontrado un camino nuevo para las Indias tomando un derrotero al oeste. Pocos años después atrevidos navegantes españoles, portugueses, italianos é ingleses exploraron las costas del nuevo continente.

Americo Vespucio en su célebre tercer viaje, de 1501 á 1502, habiendo navegado describiendo un arco de noventa grados entre Lisboa y las islas de las Georgias del Sur, llegó á comprender que era un nuevo mundo (Mundus Novus), pues era en realidad la América del Sur. No es nuestro intento ahora discutir porqué después de la muerte de Vespucio parte de la América del Sur, y más tarde todo el continente nuevo fué llamado por su nombre; sin embargo, cuando hace pocos días tuve en mis manos el pequeño folletto publicado en 1507 por el Profesor Martin Waldseemüller, del Colegio de Saint-Dié, en Lorena, en el cual propone se le dé el nombre de América á toda la costa explorada por Vespucio, ignorando que todo formaba parte del vasto continente descubierto por Colón, no pude menos de sonreirme amargamente de los esfuerzos titánicos é infructuosos que nosotros hacemos para conseguir con nuestras observaciones la inmortalidad, mientras que en este caso la Fama caprichosamente ha ceñido con los laureles del descubrimiento más grandioso una cabeza que ni los reclamó ni tiene derecho á ellos.

La geología y la paleontología nos han demostrado que este llamado Nuevo Mundo era desde el punto de vista científico acreedor al nombre de Viejo Mundo. Las estratificaciones más antiguas tienen su desarrollo máximo en su superficie, y animales como el caballo, que se dice fueron introducidos después de 1492, se ha demostrado que habitaban ántes este continente, y que después emigraron á Europa; de modo que Cortés y Pizarro no hicieron más que volverlos á introducir á sus antiguas praderas. Es de mucha importancia recordar el hecho que toda la América del Norte y del Sur estaba en la fecha de 1492 habitada más ó menos populosamente por los descendientes de tribus que habían habitado aquí desde épocas remotísimas. Un autor competente nos asegura que el número de estos aborígenes era probablemente de doce á quince millones; y que no obstante las diferencias físicas que existían entre algunas razas, como entre los Iroqueses de Nueva York y los Aztecas de Mejico ó los Incas del Perú, en cuanto á sus dialectos y costumbres, es generalmente admitido que esta gran población indígena de la América del Norte y del Sur, con la excepción de los Esquimales, pertenecía toda á la gran raza de los pieles rojas.*

En cuanto á los Esquimales, sus caracteres polisintéticos, ó su sistema de construcción de palabras, en los cuales se asemejan á los otros aborígenes, no parecen suficientes para contrarrestar la desemejanza física, y aun más los indicios vehementes que existen para inducirnos á creerlos descendientes de la raza extinta del Oeste de Europa, los habitantes de cuevas. El Professor Dawkins en su obra "Early Man in Britain" ha desarrollado muy especialmente este argumento. Las osamentas de Esquimales recientes son tan idénticas á las de las cuevas pleistocénicas de Francia é Inglaterra, que, según autores competentes, son las mismas. El talento extraordinario de los Esquimales en cuanto al dibujo exacto de figuras humanas y animales es único entre las razas salvajes, con la única excepción de los habitadores de cuevas de Europa, en las cuales se encontraron idénticos dibujos. El *Ovibos moschatus*, que era el compañero inseparable de los habitantes de cuevas, ya no existe, á no ser en la América subártica, entre los Esquimales; pero los fósiles de estos animales se encuentran en rumbo marcado en el Hemisferio Oriental, desde los Pirineos, a través de la Alemania y Rusia y toda la gran extensión de la Siberia.

Los Esquimales, así como los pieles rojas, parecen haber emigrado á este continente en la misma época, ó quizas, mas probablemente, en épocas sucesivas de los más remotos tiempos, cuando la extremidad

* La palabra "raza" es evidente que se toma aquí en su sentido étnico más lato. Desde este punto de vista los Ingleses, Franceses y Griegos son diferentes ramificaciones de una misma raza. Indiscutiblemente, según observa John Fiske, "los Mejicanos encontrados por Cortés se diferenciaban de los Iroqueses que encontró Champlain tanto como un Inglés se diferencia de un Albanés ó un Montenegrino; pero cuando comparamos los aborígenes americanos con la raza blanca ó la amarilla, es correcto decir que los Mejicanos y los Iroqueses pertenecían á la misma raza."

noroeste de América astaba unida á la Siberia por la elevación del área ahora conocida por el Mar de Béring, ó cuando la alta cresta submarina que ahora se extiende desde la Francia hasta la Grœnlandia era tan elevada que se podía pasar á pie de la Europa á la América. Si se trata de saber fijamente en qué epoca geológica ocurrió esta emigración si fué de un golpe, ó mas probablemente en oleadas sucesivas, encontraremos problemas de insuperable resolución.

Los aborígenes que vivían aquí en la época del descubrimiento de Colón presentaban, es verdad, grandes diferencias en el estado de civilización que habían alcanzado, así como en sus idiomas y hasta en su apariencia. Hay grandes intérvalos de desarrollo social entre la zahurda miserable del salvaje de California, la larga choza del Iroqués y las grandes estructuras de Zuñi, Tlascala ó Uxmal. Sinembargo, se puede demostrar que en todos ellos había un principio oculto que obedecía á la adaptación á la vida comunal que se cree observaban todos los aborígenes de las Américas. Todas las tentativas para hacer una distinción entre los que habitaban chozas de barro y los demás han sido infructuosas ante el estudio crítico; y los argumentos de la filología confirman los resultados de los estudios zoológicos de la unidad esencial de la raza cobriza americana. Las tribus en las distintas partes de este vasto territorio presentaban ciertamente marcadas diferencias en la apariencia física, y nuestras colecciones etnológicas nos demuestran que en cuanto al tamaño y peso del esqueleto y la forma del cráneo había grandes diferencias entre ellos; pero todos tenían el mismo color cobrizo, los carrillos muy prominentes, ojos pequeños y hundidos, el pelo negro y lacio y la escaséz ó falta de barba; por cuyo motivo los autores más competentes no han podido encontrar suficientes diferencias físicas, linguísticas ó sociales contra la evidencia de la unidad de la raza.

Afortunadamente no estamos llamados á referir la historia geológica americana. Para nuestro fin es indiferente que todas las reliquias de la América antigua sean de un tipo neolítico ó que al fin se pruebe que existen también restos paleolíticos; pero lo que sí sabemos es que el clima y la tierra eran propicios al desarrollo de una población ya numerosa, vigorosa, fuerte y resistente, así como de hombres valientes y belicosos, aunque á menudo crueles, y que evidentemente avanzaban á un estado de civilización, si bien á pasos diferentes, según la localidad. Desconocedores como somos del origen primitivo de esta raza, es dudoso que los más ardientes sostenedores de la idea monogenistas* de que todo el género humano desciende originalmente de una sola, pareja, quieran afirmar que nuestros aborígines descendieron asimismo

* Es bien sabido que las tendencias de las ciencias naturales están á favor de estas ideas. Los filólogos parecen estar dispuestos á admitir que, á causa de la mutabilidad de las lenguas, especialmente en su estado primitivo y cuando no han sido escritas, no se puede llegar á conclusiones adversas á la doctrina monogenística, basadas en la diversidad de los idiomas hoy existentes, ó que han existido en épocas anteriores.

de una sola, ó aun de algunos botes cargados de asiáticos accidentalmente arrojado á nuestra costa del Pacífico; ó que volvamos á oir esos argumentos apoyados en la semejanza entre las tradiciones, idiomas, costumbres y objetos hechos á mano de los aborígenes americanos y los de varias naciones orientales. La sorpresa que, estoy seguro, nos han causado á todas esas semejanzas, debe cesar ante estos dos pensamientos tan bien expresados, por Fiske y por Lubbock respectivamente, á saber: que una de las más importantes lecciones grabadas en nuestro entendimiento por un largo estudio de la mitología comparada, es que la mente del hombre, en distintas partes del mundo, pero bajo la influencia de las mismas circunstancias, origina y desarrolla idénticas ideas, y las reviste con las mismas formas de expresión; y también que diferentes razas en el mismo estado de desarrollo á menudo presentan mayores semejanzas unas con otras que una raza consigo misma en diferentes períodos de su historia.

Mucho se ha censurado el cruel tratamiento que recibieron los aborígenes americanos á manos de los Europeos; pero no ha sido otra cosa que la misma triste historia repetida tantas veces, siempre que una raza primitiva, ignorante y mal armada ha entrado en conflicto con otra mas civilizada y bien armada. Sobre el cuadro triste de la esclavitud de los Indios más vale correr un velo, aunque sus sombras más oscuras fueron atenuadas por el esplendor del carácter y de las gestiones del ilustre Las Casas y por las sabias iniciativas de hombres tan eminentes como el Emperador Carlos V, el Papa Pablo III y el Cardenal Jiménez; pero es una extravagancia romancesca el deplorar la destrucción de cualquiera forma de gobierno ó sociedad existente en este continente en 1492.*

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*Creo conveniente dar aquí un breve extracto del método ingenioso propuesto por Lewis Morgan, de Róchester, Nueva York, para medir el verdadero estado primitivo de las razas en una escala étnica. Es evidente que todo plan semejante se presta á la crítica, y no es extraño, pues, que los arqueólogos estén divididos sobre los méritos de este plan en particular.

Los períodos étnicos, según Morgan, son: el del salvajismo, el de la barbarie y el de la civilización, y en cada uno de los dos primeros períodos hay tres estados secundarios.

La distinción entre el salvajismo y la barbarie está marcada por la aparición de la fabricación de artículos de alfarería. En el estado primitivo del salvajismo vivía el hombre en su reducida guarida y se alimentaba de frutas y nueces. El lenguaje articulado puede suponerse que principió en este estado. Todas las razas humanas pasaron de este estado en períodos de tiempo desconocidos.

En el estado medio del salvajismo aprendió el hombre el modo de pescar y el uso del fuego. Mi amigo, el Dr. Lumholtz, vivió muchos meses entre los caníbales de la Australia, que se hallan en este estado. El invento de la flecha marca el fin de este período.

El estado más avanzado del salvajismo, en el cual aún continúan algunas de las razas de los Indios americanos, como los Atabaskans de la Bahía de Hudson y los indígenas de la Tierra del Fuego, termina, como hemos dicho, con la invención de la alfarería; estas tribus desconocen la horticultura, no fabrican artículos de alfarería,

Si el presente estado de los indígenas de la América del Norte y del Sur está lejos de ser satisfactorio en cuanto al desarrollo que prometían algunas de las tribus, especialmente de la América del Sur, durante el primer siglo después de la conquista, quizás podamos atribuirlo á la mala legislación de los conquistadores, á la ausencia de instrucción religiosa continua, y á la vil codicia que indujo á fomentar la fatal pasión por las bebidas embriagantes, tan común entre los pueblos bárbaros. Creo que no existe suficiente causa para dudar que con un tratamiento más equitativo y más inteligente, los que quedan de los aborígenes americanos pueden llegar gradualmente á ser ciudadanos útiles de nuestras repúblicas, y asimilarse á la masa de nuestra población.

Es fácil de aseverar y difícil de confutar que el desarrollo de la raza de los pieles rojas de este continente progresaba lentamente antes de 1492. Es un hecho que carecemos de datos tanto de su más remota historia como del estado primitivo y de la marcha en el desarrollo de ninguna de las razas más civilizadas, para poder hacer una comparación. Los conocimientos más remotos que tenemos de los antiguos

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y dependen para su alimentación de las raíces farinaceas, el pascado y la caza, y apenas viven en poblaciones.

El primer estado del barbarismo está indicado por la domesticación de otros animales, no contando el perro. En 1492, á no ser en el Perú, el único animal domesticado era el perro, y Fiske llama la atención sobre que la falta de animales domésticos era la causa de la retardación del desarrollo de los Indios americanos. El caballo, de cuya familia existieron seis ó siete especies, según lo demuestran los restos fósiles encontrados, desapareció y fué reintroducido después por los invasores. El cultivo de las tierras y la irrigación, así como el uso del adobe y la piedra en construcciones arquitectónicas, marcan el fin del primer estado del barbarismo.

El segundo ó estado medio está marcado en el Hemisferio del Este por la domesticación de otros animales además del perro, y allá, tanto como aquí, por el desarrollo de la irrigación en la agricultura, el uso del ladrillo y la piedra en la arquitectura, por el gran mejoramiento en la fabricación de artículos de alfarería, y por último, por la introducción de utensilios de cobre y de bronce.

Puede decirse que este período termina con el descubrimiento del procedimiento de fundir el mineral de hierro, el cual se hace más y más importante en el tercer estado del barbarismo y está finalmente asociado con la producción de documentos escritos por medio de alfabetos fonéticos ó geroglíficos perfeccionados.

Los que están en favor de esta clasificación aseguran que facilita mucho el estudio comparativo de las razas primitivas, pues nos proporciona una significación y límites definidos entre el estado salvaje y el de barbarismo, y debiera disipar la repugnancia sentimental con que se ha mirado siempre esta última palabra. Es manifiestamente imposible determinar en la mayor parte de los casos la duración de los varios períodos enumerados, pues parece evidente que ciertas razas han pasado por algunos de ellos más rápidamente que otras. Entre las causas que han influido en el desarrollo de la civilización de las razas, se nos sugieren las siguientes: Las condiciones más ó ménos favorables de la tierra y del clima para proporcionar abundantes medios de subsistencia; la existencia ó carencia de varios animales fácilmente domesticados, especialmente el caballo, la oveja, y el ganado vacuno; las oportunidades para el contacto por medio de la emigración, el comercio ó la guerra, con las razas que ocupan un grado más alto en la escala étnica; y las ventajas ó defectos étnicos inherentes en razas especiales.

Egipcios nos revelan que vivían ya en un estado de civilización un entero período étnico más avanzado que el de los Aztecas. Cuántos siglos pasaron entre los períodos del salvajismo y la barbarie de los Egipcios nunca se sabrá. No hay razon para dudar que si la América no hubiese sido descubierta todavía, se estarían dando aquí en estos últimos cuatrocientos años esos pasos más ó ménos lentos en la marcha hacia un estado social más civilizado. Los Europeos han cometido errores y atrocidades aquí en nombre de la civilización y de la libertad; pero tenemos que admitir que grandes ventajas se han obtenido con la conquista hecha por los Europeos de los siglos quince y diez y seis de tribus, la más adelantada de las cuales, se hallaba todavía en un estado muy primitivo de civilización.

Me he aventurado á hacer este rápido bosquejo de un asunto bien conocido, porque es conveniente que tengamos claramente presente el estado de desarrollo que existía en América hace cuatrocientos años, cuando se dió comienzo á la introducción de las razas eruropeas y de la civilización.

Aquí nos reunimos hoy para representar lo que ellas han conseguido en sus nuevas posesiones durante estos cuatrocientos años. No pueden dejar de interesarnos los conocimientos científicos que en estos ramos fueron traídos aquí; cuales fueron los obstáculos que hubo que vencer; hasta qué grado puede considerarse satisfactorio nuestro estado de civilización; cuales son los temas que nos interesan á todos, y en qué camino de investigaciones podemos unirnos para el bién de todos, y el progreso de la ciencia.

Las palabras grabadas en la tumba de Fernando Colón en Sevilla:

A Castilla y á León
Nuevo mundo dió Colón,

encierran una verdad incuestionable; pero no expresan toda la realidad. John Fiske dice bien: "El descubrimiente de América puede considerarse como un suceso sin igual; pero tiene también que ser considerado como un procedimiento prolongado y multiforme. El suceso sin igual fué la travesía del Mar de Tinieblas en 1492, y no hay argumentos, por más ingeniosos que sean, que puedan quitarles á Colón y á España la gloria de un hecho que no tiene igual en la historia del género humano. Fué un suceso que estableció un contacto verdadero y permanente entre la mitad oriental y la occidental de nuestro planeta, y unió las dos corrientes de la vida humana que habían corrido separadas en distintos cauces desde el período glacial." Pero para demostrar la magnitud de este descubrimiento; para determinar los caracteres físicos de este continente occidental; para arraigar las semillas de la civilización europea se requirieron los esfuerzos heroicos de dos siglos enteros. No solamente España, sino Portugal, Italia, Francia, Inglaterra, Holanda, Dinamarca y Rusia tomaron su parte en la gran empresa, y los nombres de Cabral, Pinzón y Magallanes, de Cortés, Balboa y Pizarro, de Ponce de León y Soto, de Champlain, La Salle, Drake, Hudson, Baffin, Davis

y Béring deben quedar para siempre asociados en la obra estupenda y progresiva del descubrimiento. Hasta 1806 no vino á darse el último paso por Lewis y Clark, quienes cruzaron el continente de Norte América de este á oeste, y terminaron así la empresa comenzada por Champlain en 1608. Si sólo el estudio de la extensión de la tierra ya descubierta exigió dos siglos; ¿qué diremos de los obstáculos mayores que se opusieron á la colonización del vasto territorio y á la formación y establecimiento de gobiernos adecuados y de relaciones armoniosas entre los numerosos estados y países en que la América pronto se subdividió?

Los más antiguos gobiernos de Europa parece que necesitan aún apoyos artificiales, y sus disturbios no son á la verdad nada agradables. ¿Es acaso de extrañarse que nosotros en este hemisferio tengamos también nuestras pequeñas disensiones así intestinas como con nuestros vecinos, en prueba de que la educación de estos países es aún lastimosamente imperfecta en lo que atañe al bienestar común? De una cosa podemos estar seguros por lo ménos, y es de que cuanto tiende á fomentar las francas relaciones entre nuestros países es una ayuda poderosa para la resolución del arduo problema de nuestro bienestar. El dicho corriente de que excusamos á aquellos que conocemos contiene una verdad; pero podría añadirse, con respecto á las naciones más estrictamente que con respecto á los individuos, que el conocimiento mútuo engendra el afecto. Recordamos con un vivo interés el sabio consejo del ilustre Franklin, quien, en 1749, incorporó en su plán para la organización de la Universidad de Pensilvania una cláusula abogando decididamente por la completa enseñanza de los idiomas español y portugués, como medios de apresurar el desarrollo de esas íntimas y recíprocas relaciones que previó se establecerian inevitablemente entre los países de las dos Américas. El espíritu de la época infundido en nuestros sistemas de educación y en nuestra literatura; y las gigantescas fuerzas del vapor y la electricidad que unen los más distantes puntos de nuestro territorio, trabajan de común acuerdo por la ilustración, la elevación, el mejor conocimiento mútuo y las más cordiales relaciones entre todos nosotros.

El año cuyo cuarto centenario actualmente estamos celebrando vió el mundo tan agitado como jamás lo estuvo. Una obra de gran importancia para el género humano hacía tiempo se venía efectuando en la sombra de la que á menudo se ha llamado la Edad Tenebrosa. Cuanto más estudiamos ese período de gran interés, más apreciamos la magnitud y la necesidad de los cambios realizados durante esos siglos de preparación para las espléndidas actividades del Renacimiento. Puede decirse que la misión de la Edad Media fué cosmopolita, y que una de las hazañas más nobles del Renacimiento fué el descubrimiento de América. Hacía tiempo que estaban desapareciendo las barreras entre las naciones, y que la mezcla de unos pueblos con otros que tan vastos resultados ha dado en el Hemisferio del Oeste, se estaba llevando á cabo. Las protestas contra el mero dogma en religión y filosofía, las revoluciones contra el

absolutismo, el ansia natural de luz y de ciencia, y los derechos naturales de la humanidad, se despertaron entonces para nunca más rendirse al sueño, hasta que en fecha aurea, pero aún muy distante, se anunciará la libertad universal y la pacificación completa por medio del arbitraje. No debemos de burlarnos de los sueños dorados de los hombres de 1492 que tardaron tanto tiempo en realizarse; y es triste el ver que á fines de este siglo diez y nueve después de Cristo se noten en la aurora de la civilización sombras oscuras, como restos de la noche de la Edad Media.

Es de extrañar el modo con que cada generación desatiende con la impaciencia de niños las lecciones de lo pasado y cierra sus ojos á las verdades que tranquilamente nos enseña la historia inexorable, á saber: que se requieren largos períodos de tiempo para realizar todo gran progreso en el verdadero camino de la religión, la política, la sociología ó la ciencia.

En nada tanto como en las ciencias médicas debe considerarse el descubrimiento de América como la línea divisoria entre la Edad Media y la Edad Moderna. No obstante los vastos conocimientos de los grandes médicos arabes y judíos, como Avicena, el príncipe de los médicos, Albucasis, Avenzoar, el sabio é ilustre, y Maimónides, sus conocimientos eran más filosóficos y especulativos que positivos. Grandes universidades se formaron, algunas de las cuales, como la de Bagdad y Córdova, poseyeron grandes rentas y magníficas bibliotecas. Numerosos hospitales también se erigieron, entre los cuales merece mención especial el del Cairo en 1283.* Pero el prolongado predominio de los moros y árabes en cuanto se relaciona con las ciencias médicas no fué marcado más que por el adelanto de la química y de la farmacia, la introducción de muchos remedios nuevos y la promoción de la union de las ciencias naturales con la medicina. Su química estaba fuertemente adulterada con la alquimia; su enseñanza clínica era elemental, y sus diagnósticos y tratamientos carecían de la verdadera fuerza y rectitud de un Hipócrates.

Las innumerables discusiones y especulaciones metafísicas pronto probaron que no era aquél el modo de poder conseguir el verdadero progreso.

Las observaciones aisladas habían progresado apenas en mil ochocientos años más alla de donde las había dejado Hipócrates. La verdadera ciencia médica, que no podía adelantar sin métodos fijos, é instrumentos de precisión, se vió obligada á esperar que por otros rumbos viniese la era de la verdad, ayudada por el estudio experimental. El inmortal descubrimiento de Harvey de la circulación de la sangre no fué anunciado hasta 1616, y su casi tan grande descubrimiento de que todos los animales súperiores procedían de un huevo no se publicó

* Los primeros hospitales, estrictamente hablando, se fundaron en el año de 335 de la Era Cristiana por Elena, la madre de Constantino, en Constantinopla y Jerusalén. El de Antioquía se fundó en 360, y el famoso hospital Basílides en Cesarea en 375.

hasta 1651; y sin embargo, puede decirse que los trabajos de aquel modesto inglés y verdadero hombre científico hicieron más por el adelanto de los conocimientos médicos que todos los trabajos de todas las escuelas anteriores desde la época de Hipócrates. No solamente fueron de gran importancia las verdades que demostró, sino que su método de investigación experimental concienzuda marcó un nuevo período en la marcha de las ciencias médicas y le hace el padre de la medicina moderna.

Galileo fué el que primero indicó el uso del termómetro en la medicina, en 1595. Sagredo, de Venecia, lo mejoró en 1613, y Sanctorio, en 1625, insistió urgentemente sobre su utilidad; pero no fué sino á mediados de este siglo cuando Wunderlich colocó la termometría médica sobre bases tan sólidas que se hizo indiscutible su utilidad. Así como el astrónomo Galileo nos dió las primeras leyes del termómetro, así también otro astrónomo, Keplero, dió, en 1604, la primera descripción exacta del pulso humano. Pero este dato tan importante en el estudio de las enfermedades hizo tan poca impresión en la profesión médica, que el perspicaz Sydenham, que vivió hasta 1689, en ninguna de sus obras menciona nada sobre el pulso, y en casi ninguna de las obras de aquella época que mencionan el pulso se dice nada sobre su importancia en la patología. ¿Qué progreso podía hacerse en la medicina exacta sin la química? Y sin embargo, poco se hizo por el adelanto de ese ramo desde el siglo octavo hasta el décimosétimo. Boyle fué el padre de la química moderna (nació en 1627 y murió en 1691), y fué quien logró librar de las trabas de la alquimia á esa noble ciencia. Hasta fines del siglo diez y siete no se estimó el valor del análisis cuantitativo, y finalmente hasta 1590 no tenemos noticia del primer microscopio en manos de Jansen.

Mientras tanto la superstición combinada con la fe ciega en los maestros antiguos, y especialmente en Aristóteles y Galeno, cuyas teorías habían predominado por tanto tiempo en la medicina, cedían gradualmente á la luz de los conocimientos positivos. Las fantásticas nociones de la alquimia y de la astrología, la ignorancia y el fanatismo que ponían cada órgano del cuerpo humano bajo la protección especial de un santo, unían cada remedio á una forma especial de rogativa, marcaban todavía la enseñanza y práctica de la medicina. Pero el atrevido espíritu de investigación del siglo diez y seis trabajó por la medicina, como lo hizo por otras grandes cosas. Vesalio (1514 á 1564) y sus contemporáneos crearon la anatomía exacta. Paré (1509 á 1590) estampó para siempre la marca de su genio y de su carácter en la cirugía. Paracelso (1495 á 1541) ridiculizó las teorías antiguas é hizo un importante esfuerzo por emancipar el pensamiento médico. El gran método de Hipócrates de investigación detenida y concienzuda echó de nuevo raices; y abandonada la infructuosa filosofía de Galeno y sus adoradores árabes, al fin principia á brillar, saliendo de la oscuridad de tantos siglos, la medicina moderna, la medicina de la fidelidad á la naturaleza y la rebelión

contra la mera autoridad humana; del escepticismo reverente y de la fe razonable; la medicina de los experimentos científicos y de la vivisección sin causar sufrimientos; la medicina que insiste en conocer las causas de las enfermedades y considera la higiene como su mas noble expresión.

La historia de la medicina europea de más de trescientos años á esta parte es una narración de la cual podemos estar orgullosos, si tenemos en cuenta los obstáculos que se han opuesto á su progreso. Vesalio y Paré, Harvey y Sydenham están relacionados con Bichat y Laennec, Húnter y Jénner, Pasteur y Líster, Virchow y Koch, formando la gran cadena de nombres inmortales que nos han dado la luz con sus descubrimientos científicos. Pero es triste reflexionar sobre lo que se ha hecho y lo que pudo haberse realizado. La ignorancia de los dominadores en cuestiones científicas, la lentitud del progreso de los conocimientos prácticos en las masas, y el predominio del imperialismo y del militarismo han impedido la promulgación de leyes que hubieran ayudado más al progreso de las ciencias médicas. Aún en la actualidad hay un contraste marcado entre lo que gastan los gobiernos más adelantados de Europa en propagar la educación y las investigaciones científicas, y lo que se desembolsa para el sostenimiento de esos grandes ejércitos y esas armadas que se dice son necesarios para el mantenimiento de la paz y del orden.

En nuestra misma época hemos visto el anuncio de la generalización más grandiosa que ha formado el entendimiento humano, en este siglo por lo ménos, anuncio hecho del modo más filosófico é inofensivo, recibido con un desbordamiento de escepticismo intelectual y de intolerancia religiosa que demuestra que las antiguas fuerzas contra las cuales protestó el Renacimiento existen todavía, aunque, afortunadamente, privadas de su anterior poderío. La maravillosa rapidez con que se han propagado las teorías de Darwin, y su incorporación en los pensamientos y las conversaciones del mundo, así como en la enseñanza de las iglesias, puede decirse que constituyen el triunfo intelectual más culminante del siglo diez y nueve.*

Si el progreso real de la medicina fué lento en Europa durante los años que se siguieron al *annus mirabilis*—1492—seguramente que no

*La tumba de Harvey en la iglesia de Hémpstead, tiene un epitafio que nos dice nació el 1° de abril de 1578 y murió el 3 de junio de 1657. Su obra inmortal, "Exercitatio Anatomica de Motu Cordis et Sanguinis," no obtuvo la aprobación de la censura de la prensa en Inglaterra, y no se publicó hasta 1628 en Fránkfort. Aunque susceptible de fácil demostración, aquel descubrimiento que forma época en la ciencia tuvo un influjo negativo en la teoría y la práctica médica de entonces. Darwin reposa en la abadía de Wéstminster, con los soberanos, los hombres de estado y los guerreros de una nación altiva. Su epitafio dice que nació el 12 de octubre de 1809 y falleció el 19 de abril de 1882, y su obra principal, "On the Origin of Species," se publicó en 1859, á los cincuenta años de su edad, y fué durante su vida traducida á todos los idiomas modernos, alcanzando seis ediciones y sententa y dos mil ejemplares en Inglaterra.

podemos tener queja alguna contra los primeros colonizadores de las Américas del Norte y del Sur; porque les fué imposible, en medio de sus heroicos esfuerzos para conquistar este vasto territorio, ocuparse en el cultivo de las ciencias esenciales para el estudio de la medicina.* En 1551 fundó Carlos V la Universidad de Lima en el Perú, y en 1553 la Universidad de Méjico, y sin embargo no se enseñó la medicina en aquellas universidades hasta 1700.†

En la América del Norte, aunque el Colegio de Hárvard fué fundado en 1636, se dió primero el título de Universidad á la de Pensilvania, que en 1765 estableció la primera escuela de medicina en los Estados Unidos. Las primeras y poco numerosas colonias diseminadas en este vasto país tenían á la verdad que lidiar con problemas más importantes que el del fomento de la medicina, y separadas como estaban de la madre patria, viéndose á menudo tiránicamente dominadas por el Gobierno de la Metrópoli y en guerra contínua con los aborígenes, sin contar con las desconocidas condiciones políticas y climatológicas del país, harto tenían en qué ocupar su atención. Ya hemos visto que sólo el trabajo preliminar de exploración ocupó dos siglos. El final del tercer siglo halló aquellas luchas próximas á terminarse triunfalmente, sólo para ser seguidas de violentos cambios políticos que no se llevaron á cabo síno á costa de dispendiosas guerras.

La conquista del Canada por los Ingleses, de 1759 á 1760, la independencia de los Estados Unidos en 1783, la independencia de las Repúblicas Sud-Americanas en 1810, y los veinte años subsecuentes; tales son los sucesos que el futuro historiador escogerá para marcar el período del Renacimiento ó Decadencia en América, y á los cuales habrá que referirse siempre para determinar nuestra capacidad para el progreso en política, en literatura, en artes y en ciencias.

Por mucho tiempo aseguraban aun los críticos mas benévolos que las nuevas razas que luchaban por arraigarse en el suelo americano no podrían prosperar como en sus países natales, y que sería imposible formar un tipo de raza característico americano. Para aquellos de nosotros que hemos estudiado con ansiedad este punto, las últimas dos décadas han disipado todos nuestros temores. Sean cuales fueren los cambios futuros en la organización política ó las relaciones de los países que componen la América, está ya demostrado que las razas europeas que la han poblado y que ya suman más de cien millones de almas, no mostrarán decadencia en su vigor ó en su energía, ni en sus fuerzas físicas y mentales. No meramente por lo grande de nuestros triunfos materiales señalamos los millones que pelearon en nuestra gran guerra civil, ni las ciento setenta mil millas de ferrocarril que cubren los Estados Unidos—casi tantas como hay en todo el resto del mundo—y los

*La primera prensa de imprimir de Norte América, según se dice, fué establecida en 1639 en la casa del Presidente Dúnster, del Colegio de Hárvard.

†El Dr. Billings nos dice que hay una queja archivada de la carencia de cadáveres en la Universidad de Méjico para las demostraciones de la clase de anatomía.

$10,000,000,000 de capital invertidos en esas líneas; ó su ejército de novecientos mil empleados; ó aquella estupenda obra—el ferrocarril del Canadá al Pacífico; ó los planes que hoy se estudian para construir un sistema contínuo de ferrocarriles en todo el continente, desde Montreal ó la Bahía de Puget hasta Buenos Aires; por la evidencia que presentan de una vasta imaginación, animosa resolución, intrépida tenacidad de propósito y enorme capacidad física para las fatigas, damos valor á las empresas que han subyugado tan rápidamente este continente, y están apresurando su consolidación comercial. Podemos estar seguros de que unos países que han demostrado un amor tan tenaz á la independencia, resistiendo toda intervención extraña; que han sido tan sagaces en adaptar sus constituciones políticas á sus condiciones peculiares; que ofrecen la libertad y las franquicias é iguales oportunidades para su mejoramiento á todos cuantos viven dentro de los límites de sus territorios, lograrán labrar su destino bajo planes más vastos y más sabios de amigable cooperación de lo que podemos prever.

Turgot, en su memorable discurso pronunciado en la Sorbona, dijo acertadamente: "Tous les âges sont enchaînés par une suite de causes et d'effets qui lient l'état du monde à tous ceux qui l'ont précédés." El descubrimiento de América dependió de causas que se pueden hacer remontar á siglos muy remotos. El presente estado de nuestro continente, cuatrocientos años después, es el resultado de la acción y la reacción de poderosos movimientos en que se vieron envueltos todos los países del mundo. Este país es el primer lugar, y probablemente será el último, en que se han reunido y entremezclado todas las nacionalidades del mundo. Aquí como en ningún otro lugar, pueden estudiarse con la ayuda de las ciencias exactas los problemas de la etnología y la sociología.* Aquí es donde con mejores resultados pueden resolverse

* Fué por esto que me mostré tan deseoso de que se organizara la Sociedad Antropológica Americana, que felizmente se estableció en 1891. La acción recíproca entre la actividad funcional y el desarrollo cerebral está demostrada por tantos hechos, y los métodos de examinar y anotar la disposición exacta y la diminuta estructura de los centros nerviosos están tan firmemente establecidos, que parece haber llegado la hora de empezar á estudiar sobre una ancha y sistemática base los cambios anatómicos progresivamente efectuados en sucesivas generaciones de individuos sujetos á las condiciones ambientes estimulantes, que con tanta rapidez cambian en nuestra vida moderna. Los miembros fundadores de esta sociedad convienen en que se permita hacer la autopsia y examen *post-mortem* del cerebro. Los demás miembros no han contraído semejante compromiso; pero todos están interesados en las investigaciones antropométricas y etnológicas. El designio de la obra emprendida por esta sociedad es de vasta y profunda importancia. Se cree que en ninguna parte como en América se pueden proseguir con tanto provecho estas investigaciones. La organización tiene, sin embargo, un carácter esencialmente internacional. Difícil es exagerar el valor de una serie de fotografías exactas de la estructura macroscópica y microscópica del cerebro obtenidas en generaciones sucesivas aun durante un período que no pase de mil años. Estos comprobantes se obtendrán de los individuos de las diferentes razas que viven bajo las mismas ó enteramente distintas condiciones físicas; y

los problemas concernientes á las relaciones del hombre con su medio ambiente físico, y llegar á la demostración de que, á pesar de la aparente magnitud de las fuerzas de la naturaleza, y no obstante el admitido influjo del clima y de las condiciones físicas sobre el progreso de la civilización, el poder del hombre para el adelante intelectual y social es incalculablemente superior.

En toda esta obra le toca una gran parte á la profesión médica, y afortunadamente nuestra posición en América nos facilitará el poder trabajar unidos y con buenos resultados. El alto grado de la inteligencia común de nuestro pueblo le hará apreciar desde luego unos resultados de tan solida utilidad y de tanto valor científico. Las inmensas riquezas presentes y en perspectiva de este continente deberían aplicarse cada día con mayor munificencia al fomento de la educación y las investigaciones—si, como es de esperarse confiadamente, nos esforzamos cada vez más por asegurar la paz entre nosotros y con todo el mundo.

Nunca cesaremos de enorgullecernos de nuestros antepasados, ni de reconocer lo mucho que le debemos á Europa: sus idiomas son los nuestros; su glorioso pasado es una parte de nuestra herencia; los ilustres nombres de sus grandes hombres en las artes, la filosofía y la ciencia, son palabras de uso corriente en nuestros hogares; sus rápidos adelantos en civilización nos estimulan á mayores esfuerzos; pero se está pasando de nuevo el balance entre el Viejo y el Nuevo Mundo.

Todos sabemos como los ejemplos de nuestras nuevas y vigorosas comunidades han suministrado y alimentado los principios contagiosos de la libertad política y de la igualdad social.* En todas las luchas por los derechos del hombre, desde el terrible pero beneficioso drama de la Revolución francesa hasta nuestros días, se ha invocado nuestro ejemplo y nuestro apoyo.

No puedo deteneros ahora con una enumeración de los servicios que ha hecho la América á las ciencias médicas. Casi inmediatamente después del descubrimiento se anunciaron importantes adiciones á la farmacología, especialmente de la América del Sur, y desde la introducción del guayaco hasta la fecha han seguido aumentándose sin cesar. Todo el mundo médico estuvo agitado durante la última mitad del siglo diez y

es de esperar que se puedan obtener semejantes comprobantes de un número de familias individuales en muchas generaciones sucesivas, cuyo inteligente interés en semejantes investigaciones colectivas pueda mantenerse suficientemente vivo. La buena obra de esta sociedad progresa ya con actividad. Sus archivos se conservarán en los edificios á prueba de fuego del Instituto de Anatomía y Biología "Wistar," que forman parte de la Universidad de Pensilvania. Sin duda alguna la profesión médica de toda la América estará dispuesta á cooperar, desde su punto de vista técnico, en la gran obra etnológica y arqueológica que tan vigorosamente han emprendido los americanistas.

*Este es el único principio contagioso que hemos trasmitido. La fábula que atribuye á la América la procedencia de la sífilis europea ha sido victoriosamente confutada con pruebas concluyentes.

siete sobre los méritos de la cáscara de la quina,* introducida en Europa en 1640 por Juan del Vego; y no se puede aducir argumento más convincente sobre el valor de la ciencia médica y de la higiene que lo mucho que se ocuparon las obras y escritos médicos de los siglos diez y siete y diez y ocho de las enfermedades palúdicas, en comparación y contraste con el sentimiento de impunidad con que hoy se tratan esas afecciones. Entre los resultados de esta reunión que pueden pronosticarse, espero que sea uno la adopción de un plan bién preparado para el estudio sistemático y asociado de los remedios americanos y sus preparaciones farmacéuticas; á fin de obtener una clasificación científica y mayor uniformidad en su preparación, y finalmente una sola farmacopea para todo este continente.

La introducción del protóxido de nitrógeno (en 1844) y del éter (en 1846) en la práctica de la medicina, con cuya introducción están tan honrosamente asociados los nombres de Wells y de Morton; la operación de la ovariotomía, fundada sobre una base científica segura, por McDowell, de Kentucky—éstos y centenares de otros triunfos médicos de menor brillantez son demasiado conocidos para que se requiera mencionarlos. Todos saben cuán superfluo es decir una palabra en defensa de la literatura americana, y ciertamente los que sabemos cuán poderosamente han influido las obras médicas americanas en las opiniones y la práctica de los facultativos de Europa y el mundo entero, podemos contemplar con alguna complacencia nuestra posición. Y sin embargo, un examen de lo que América ha añadido realmente á la literatura médica demuestra claramente cuanto nos falta para estar á la altura de las naciones que van á la vanguardia del progreso en los conocimientos médicos. En 1879 dió la Bibliotheca de Rupprecht* el número total de nuevos libros médicos, publicados en el mundo, excluyendo los folletos, periódicos y actas, fijándolo en 419, divididos como sigue: Publicados en Francia, 187; en Alemania, 110; en Inglaterra, 43; en Italia, 32; en los Estados Unidos, 21; en las demás naciones, 26; y para el año de 1891 hallo que la misma Bibliotheca presenta el número total de 1,063, divididos así: en Alemania, 360; en Francia, 243; en la Gran Bretaña, 141; en los Estados Unidos, 80; en Italia, 78; en Austria-Hungría, 70; en España, 24; en otros países (principalmente en Suiza y Dinamarca), 67.

Por otra parte, en las formas más efímeras de publicaciones médicas

* Los motivos que influyeron en sus antagonistas fueron la doctrina de las calidades de los antiguos en parte, en parte el odio á los Jesuitas, que fueron los más activos en propagar el uso de esa droga, y asimismo, según afirma una tradición maliciosa, el miedo de que curaría tan eficazmente, que perjudicaría á los médicos. Aquí viene á la memorio el proverbio indio que dice: "Varias son las necesidades del hombre; leña pide el cargador, y enfermedades el Doctor.

* El Dr. J. S. Billings, en "Our Medical Literature." Discurso pronunciado en 1881 ante el Congreso Médico Internacional. Esos números, añade el autor, son demasiado reducidos, especialmente en lo que atañe á la Gran Bretaña y los Estados Unidos.

son muy diferentes los guarismos. He hecho contar cuidadosamente los volúmenes de periódicos ó revistas y actas médicas archivados en el Museo Médico del Ejército en Washington, indicando los países en que respectivamente se publican,† y el resultado demuestra que de esa clase de obras se publicaron en 1890 y 1891 en la América (incluyendo el Canadá, los Estados Unidos y la América Latina) casi doble el número de volúmenes de los publicados en Francia ó en Alemania, y tres veces tantos como en la Gran Bretaña.

	Totales.		América, incluyendo el Canadá, los Estados Unidos y la América Latina.		Alemania.		Francia.		Inglaterra y sus dependencias, ménos el Canadá.	
	1890.	1891.	1890.	1891.	1890.	1891.	1890.	1891.	1890.	1891.
Número de volúmenes de revisitas	985	1,021	278	297	159	168	153	160	81	87
Número de volúmenes de actas	319	300	104	84	48	48	35	38	36	33

	Italia.		España.		Austria-Hungría.		Bélgica.		Otros países.	
	1890.	1891.	1890.	1891.	1890.	1891.	1890.	1891.	1890.	1891.
Número de volúmenes de revistas	106	103	36	37	39	38	23	21	110	110
Número de volúmenes de actas	27	27	1	1	4	6	10	10	54	52

No debemos olvidar, por supuesto, que en la prisa con que vivimos hoy muchas observaciones é investigaciones de gran valor se publican en la prensa periódica general, en vez de insertarse en las revistas profesionales de que se forman volúmenes de mayor consideración; pero creo que no puede dudarse que el gran número de periódicos médicos dados á luz en América, en contraste con el número comparativamente pequeño de nuevas obras médicas, justifica completamente la reconocida superioridad de Alemania, Francia, y la Gran Bretaña en las ciencias médicas. El hecho de que Alemania ha subido del segundo lugar que ocupaba en esa lista, con 110 volúmenes contra los 187 de Francia, en 1879, al primer lugar que hoy tiene, con 360 obras nuevas en 1891 contra las 243 publicadas en Francia el mismo año, es un elocuente testimonio de los enérgicos esfuerzos con que la nuevamente unificada Alemania está rápidamente adelantando en ciencia, como en otros terrenos. La verdad es que el número aparentemente extraordinario de publicaciones periódicas médicas en América obedece á una causa poderosa, causa que influye también en la formación de numerosísimas escuelas y sociedades médicas: tal es la vasta extensión de territorio y lo relativamente esparcido de la población, que hacen imposible poder servir al país con

†Tengo gusto en expresar mi reconocimiento por la ayuda que me dispensó en la preparación de estos interesantes datos estadísticos el National Bureau of Medical Bibliography. Esa admirable empresa, establecida en Wáshington para tener á mano las obras de la gran biblioteca del Surgeon-General's Office, merece el aprecio y apoyo de la profesión.

un promedio tan bajo de facultativos, escuelas, sociedades y revistas como es posible en países más densamente poblados. En cuanto á otras causas menos satisfactorias que han influido, particularmente en los Estados Unidos, para producir el gran número de escuelas médicas mal provistas y de periódicos médicos escasamente sostenidos, no es necesario mencionarlas aquí. A la verdad, el grado cada vez más alto de conocimientos científicos que se requiere hoy, tanto en los facultativos como en la literatura médica, y el aprecio creciente por todas partes con que se considera el hecho de que una educación médica superior interesa no solamente á la profesión sino también al público en general, están llevando á cabo la obra de poner coto al mal aconsejado establecimiento de nuevas empresas médicas, y de estimular las existentes á seguir un curso más formal y encaminado á fines más elevados. Tan cierto es esto respecto á nuestras revistas médicas, en particular, que ninguno que haya tenido ocasión de consultar con regularidad las colecciones de cualquier número de ellas, ha podido dejar de impresionarse profundamente con el mejoramiento decidido y constante de su redacción y el mérito científico de los trabajos en ellas publicados.

Este Congreso se reune en un período de interés crítico y especial para la educación médica, y me place manifestar que por primera vez en la historia médica de los Estados Unidos podemos enorgullecernos de que se celebre aquí una reunión semejante, é invitamos á todos á que hagan un examen detenido de nuestros modelos docentes y de sus facilidades para la enseñanza. Faltaría á las reglas de la urbanidad, así como á la verdad, si no reconociese lo mucho que vale el ejemplo que tan consecuentemente han dado la América Latina y el Canadá al mantener un alto grado de educación y de conocimientos en la profesión médica.

Hace quince años la profesión médica de los Estados Unidos denunció severamente el manejo de sus numerosísimos colegios médicos.* Mientras que el Canadá exigía un examen razonablemente estricto para ser admitido á un curso de estudios médicos que ocupaba cuatro años, con una sesión de seis meses en cada año, y mientras que en todos los países de la América Latina se requería un bachillerato ó un rígido examen para la admisión á un curso de estudios médicos de más de seis años, era costumbre general en los colegios médicos de los Estados Unidos conceder un diploma, confiriendo plenos derechos para practicar la medicina á todo estudiante que lo solicitaba después de haber seguido, sin examen preliminar de admisión, y sin examenes de prueba, dos cursos de conferencias de unos cinco meses cada uno, y haber pasado por un solo examen final, dirigido por sus mismos maestros ó profesores, cuyos honorarios dependían del estipendio pagado por esos estudiantes. Esta poco honrosa prostitucion de la enseñanza fué el efecto de causas que no quiero comentar ahora. Empero con justificable satisfacción podemos señalar hoy las radicales y admirables reformas que se han hecho

* Escuelas alopáticas, 65; homeopáticas, 11; eclécticas, 4; total 80, en 1877.

después. Es verdad que todavía permiten las leyes de muchos de los Estados la incorporación de escuelas médicas sin ninguna garantía sobre el carácter de la enseñanza en ellas mantenida. Pero el espíritu que se ha despertado en la profesión y en la comunidad ha insistido, en un número cada día mayor de los Estados, en que no se permita ejercer la profesión de médico á los que se han recibido, ántes de someterse á un examen dirigido por una junta de facultativos imparciales nombrada por el gobernador. Las escuelas médicas, sea dicho en honor de ellas, han sido, con pocas excepciones, las primeras que se han esforzado per conseguir esta sabia y provechosa legislación. Han hecho más aún, pues adelantándose á esas leyes, las facultades de cierto número de los colegios principales exigieron primero cursos obligatorios de tres años, y ahora de cuatro años, con ocho meses de estudios en cada uno, y un plan de estudios acertadamente graduado, y rígidos examenes ántes de ser los estudiantes admitidos al colegio, al terminar cada curso y finalmente antes de recibirse.

Al recordar que esto se ha hecho sin la más ligera ayuda del Gobierno, y más aún, cuando se considera que, á causa de la reinante creencia quo los colegios médicos han producido pingües ganancias á sus facultades, no se han encauzado todavía hacia ellos las corrientes de los donativos particulares, podréis apreciar cuán grande es la conciencia del deber y la devoción á la ciencia que han impulsado á esas facultades á tomarse mucho mayores trabajos con la perspectiva de una remuneración muy disminuída por la más reducida asistencia de estudiantes y el aumento de los desembolsos.

La Comisión de Orden de este Congreso ha decidido acertadamente que se haga una excursión para inspeccionar algunas de esas instituciones, y se confía en que todos los delegados extranjeros, y tantos como sea posible de los demás miembros del Congreso, aprovechen esta oportunidad para examinar los recursos de algunas de nuestras principales escuelas médicas. Creo que les será grato encontrar en nuestros hospitales y laboratorios, lo mismo que en nuestras bibliotecas y museos, ventajas que pueden compararse con las de Europa. Encontrarán un plan de estudios, y sobre todo una organización para la instrucción clínica diaria que deja poco que desear. Fácil es de prever que otro de los resultados apetecibles de reuniones como la presente, celebradas sucesivamente en diferentes partes de América, será aumentar de tal modo el conocimiento y la confianza en nuestros respectivos métodos de enseñanza y tratamiento médicos, que esto retendrá en nuestro continente á muchos de nuestros estudiantes y de nuestros invalidos que han acostumbrado ir más lejos sin obtener mayor provecho.

Un vasto campo se abre ante nosotros para estudiar, con la cooperación colectiva en las investigaciones, el curso y distribución de la tísis, reumatismo y de otras enfermedades principales, desde el punto de vista de las influencias de raza y localidad. Las fiebres endémicas, no inclu-

yendo las palúdicas, la tifoidea y la amarilla, que se dice reinan en varias partes de las Américas del Norte y del Sur, hace tiempo que exigen investigaciones sistemáticas para completar el estudio que de ellas inició el ilustre Drake. Ahora tendremos la oportunidad de estudiar, igualmente por medio de la investigación colectiva, los efectos relativos de los diferentes climas sobre las numerosas razas representadas hoy en América, y de determinar con mayor exactitud las cuestiones científicas y prácticas relativas á nuestros innumerables sitios balnearios y sanitarios, que abrazan lo mejor de cada clase. Fué el conocimiento de la urgente importancia de este último asunto, especialmente en nuestros días, lo que indujo al Gobierno de los Estados Unidos á extender la cordial invitación que ha sido uniformemente aceptada de parte de los otros gobiernos Pan-Americanos. Estoy persuadido que este acto ha asegurado para la higiene, y para la medicina preventiva del Estado una aceptación formal que jamás se les había dispensado ántes en este continente, y que debe ser indudablemente continuada por la disposición de los respectivos gobiernos á valerse de su influjo para obtener la promulgación y estricto cumplimiento de leyes que estén de acuerdo con las recomendaciones de este cuerpo de eminentes peritos.

Cuando se reunió en Filadelfia, en 1876, el Congreso Médico Internacional, el discurso sobre la higiene y la medicina preventiva, pronunciado por el distinguido Bowditch, uno de los primeros campeones de la ciencia sanitaria, fué uno de los más persuasivos pronunciados en aquella importante ocasión. La revista hecha en él de los trabajos de este país en la ciencia sanitaria el siglo pasado no es muy lisonjera; pero con el ardiente entusiasmo que caracterizaba á un hombre de tanto talento, predijo que iba á inaugurarse inmediatamente la época más grandiosa en la historia de la medicina. Son de citarse las palabras con que terminó su discurso: "Nuestro deber ahora es el de organización nacional, del Estado, municipal y de aldea. Desde el lugar más alto en el concejo nacional hasta la última junta de sanidad de aldea necesitamos organización. Con esas organizaciones podremos estudiar, y á menudo precavernos contra las enfermedades." Estas estimuladoras palabras estaban en armonía con el espíritu de nuestro tiempo y el desarrollo de la ciencia. Cuando los brillantes descubrimientos de Koch dieron á luz el bacilo específico de la tuberculosis y del cólera é indicaron el método científico que debía seguirse en lo venidero para semejantes investigaciones, se obtuvo un argumento irrefutable contra el escepticismo, el indiferentismo ó la penuria gubernamentales. Necesitó valor y demostró una rara latitud de ideas progresistas Lord Pálmerston al expedir su célebre contestación al Presbiterio de Edimburgo, con motivo de la amenazadora invasión del cólera en 1853, en la cual insistió con urgencia en que el bien ó el mal del género humano dependía de la observancia ó descuido de las leyes naturales que regulaban los asuntos del mundo; y que si no se destruían las causas locales de la enfermedad antes de volver los calores,

reaparecía irremediablemente la epidemia, á pesar de las rogativas y ayunos de una nación unida pero inactiva.

Mucho se hizo, es verdad, en medicina preventiva, entre 1853 y 1876, cuando habló Bowditch; pero es apenas exageración decir que el progreso de los últimos veinte años ha sido mayor que el de los veinte siglos precedentes. Es cierto que todavía no hemos descubierto el veneno específico de todas las enfermedades contagiosas; aún con respecto á la muy conocida y estudiada fiebre amarilla, las últimas publicaciones del distinguido médico mayor del ejército de los Estados Unidos indican que aún no se ha resuelto definitivamente este punto. Ha habido, sin embargo, un cambio radical en toda esta materia, habiendo cedido las hipótesis su lugar á los hechos; pues todo el mundo sabe hoy, ó debiera saber, que las más temibles enfermedades están inseparablemente relacionadas con bién definidos organismos, y que esos organismos ó gérmenes se desarrollan y distribuyen bajo leyes especiales; que destruyéndolos ó eliminándolos se evitan esas enfermedades, y que al tolerar las condiciones que favorecen su desarrollo se dá pábulo y se invita al ataque de la enfermedad. Cuando se consideran estas simples y demostrables proposiciones en conexión con azotes tales como el cólera, la fiebre amarilla, el tifo, la fiebre tifoidea, la escarlatina, la difteria y la meningitis epidémica, no se necesita otro argumento para probar el valor y la necesidad de las cuarentenas y la eficacia de la inspección y protección médicas. Ni se requiere mejor argumento para demostrar lo acertado que es establecer laboratorios de higiene en muchos puntos en todo el país, habilitándolos liberalmente con el personal más competente y con los más delicados aparatos, y detándolas generosamente, de modo que se pueda continuar con vigor incesante la investigación de las causas desconocidas aún de las enfermedades, y descubrir los mejores métodos para impedir el desarrollo de semejantes causas.

Fácil es lograr hoy se preste atención á estas observaciones; ahora que se hallan trastornadas las comodidades públicas, amenazada la riqueza pública y despierta y susceptible la conciencia pública. En estos momentos descansan nuestros centros comerciales confiados en las medidas sanitarias adoptadas por nuestros gobiernos, de acuerdo con los consejos médicos, para restringir y excluir esas dos temibles epidemias—el cólera y la fiebre amarilla. Recuérdese el terror popular del verano pasado; recuérdense las espantosas pérdidas de vidas y los efectos desastrosos sobre el comercio causados por las invasiones anteriores de esas enfermedades, cuando las poblaciones azotadas eran más pequeñas y menos ricas de lo que son actualmente las nuestras. No tenemos que remontarnos á la Edad Media á buscar los cuadros de desolación, efecto de las enfermedades epidémicas: recuérdese la trágica historia de la gran plaga de fiebre amarilla que azotó á Filadelfia hace justamente cien años, según la describe Rush; calcúlese el resul-

tado, si hubiera invadido el cólera la ciudad de Nueva York en 1892, y hallando favorables las condiciones del clima y la localidad, hubiese propagado sus gérmenes mortíferos por el Norte, el Sur y el Oeste: la bella Ciudad Blanca que á la sazón se estaba levantando en las riberas de aquel distante lago, como tocada por la vara mágica del arte y de la industria, habría en tal caso recibido un golpe de muerte, y habrían sido incalculables las pérdidas que hubieran agobiado á este país.

El pueblo entero contemplaba lleno de ansiedad la lucha que se libraba en la bahía de Nueva York, y un himno universal en acción de gracias se elevó al cielo cuando el terrible invasor fué finalmente rechazado por los enérgicos y sostenidos esfuerzos de las autoridades sanitarias. El no presenciar nosotros hoy en América la agravada repetición de la epidemia, de conformidad con los invariables antecedentes, sólo se debe á la continuación de los mismos esfuerzos, apoyados por una autorización más lata, y ayudados con una sanitación local más eficaz. Cuando tan grato resultado se asocia con el éxito que de algunos años acá han obtenido nuestros esfuerzos por impedir la entrada á la fiebre amarilla, no es necesario aducir más poderoso argumento para exigir la adopción de aquellas medidas uniformes que en lo venidero nos protejan contra la invasión de esos males. Estos ejemplos demuestran del modo más convincente la necesidad y el valor de los convenios sanitarios internacionales que puede hacer mucho este Congreso para recabar. Pero otras muchas cuestiones importantes se nos ocurrirán á todos nosotros que sólo un trabajo asiduo y colectivo podrá resolver; ni podrá llevarse á buen término semejante trabajo hasta que no se corresponda más completamente que hasta aquí ál clamor por organización lanzado por Bowditch: sólo la organización y la cooperación, y más aún, el establecimiento como parte del gobierno de cada nación civilizada de un departamento de sanidad pública, podrán proporcionar la continuada y eficaz atención que requiere una empresa de tal magnitud. Debería haber, y no está muy distante el día en que haya en el gabinete de todos los gobiernos aquí representados un secretario (ministro) de la salud pública, revestido con el mismo rango, influjo y prerogativas que los demás miembros del gabinete.

Este es pues, el último y el mayor servicio que puede hacer nuestro Congreso á la ciencia y al Estado. Nuestro influjo combinado será irresistible cuando lo usemos para abogar en pro de una educación superior; para llevar á cabo vastos planes para el estudio científico de nuestra vida nacional, hasta donde la afectan el medio ambiente social y el clima; para adoptar los remedios ó tratamientos de mérito demostrado, y para que se reconozcan más completamente las altas funciones de la medicina preventiva. "*Salus sanitasque reipublicæ, suprema lex.*" Séanos permitido unirnos aquí más íntimamente unos con otros; tener una fe más profunda en nuestra profesión y sus nobles fines, y hacer el firme propósito de trabajar en fraternal cooperación por reali-

zar el sublime ideal que consiste en servir á la ciencia y á la raza humana.*

*No sería justo dejar de hacer mención aquí de las obras de varios autores que hemos consultado para preparar este discurso, especialmente El Descubrimiento de América, por Fiske; Historia de la Medicina, por Baas (traducida por Hánderson, 1892); El Descubrimiento de Norte América, por Henry Harrise (París y Londres, 1892); La Historia del Nuevo Mundo, llamado América, por E. T. Payne (Vol. I, Oxford, 1892); Historia de la Civilización en Inglaterra, por Buckle; Historia del Desarrollo Intelectual de Europa, por Dráper; La Historia Primitiva de la Precisión Instrumental en Medicina, por el Dr. S. Weir Mítchell; Historia de la Bibliografía de la Medicina Española, por A. H. Morejón; Publicaciones y Cartas Inéditas del Dr. Daniel G. Brinton; Informe sobre la Etiología y Prevención de la Fiebre Amarilla, por George M. Stérnberg, 1890 (hoy Médico Mayor del Ejército de los Estados Unidos); Origen de la Civilización, por Lubbock, y también sus Tiempos Prehistóricos; Antropología, y también Indagacionos sobre la Historia Primitiva del Genero Humano, por Tylor; La Sociedad Antigua, por Lewis Morgan, Nueva York, 1877.

Tengo también mucho gusto en expresar mi reconocimento al Dr. R. P. Robins por la ayuda que me prestó, especialmente en el examen de la Medicina Española Primitiva.

FOURTH GENERAL SESSION.

SEPTEMBER 7, 1893.

Prayer by the Rev. George Elliott, D. D.

Almighty God, Thou art the maker of our bodies and the Father of our spirits. Help us that this day we may glorify Thee in our bodies and in our spirits which are Thine. We give Thee thanks for all the revelations Thou hast made in the world fashioned by Thy wisdom and displaying Thy power. We thank Thee that Thou hast given good gifts unto men, that Thou hast placed in the hands of men the skill of healing. The children of the Great Physician are called here to consider the sanitary needs of this great country, and we pray Thee, Our Father, that Thou hast held in the fastness of Thy purpose this new world for the solving of great problems and the leading up of races of men to new and larger achievements. Grant that by similar meetings the nations may be brought to a closer union. Grant that we all may be led out through the larger realms of spirit and through the deep mercy of Christ Jesus our Lord, with those of our families from whom we are absent, separated by all the miles and distances, and may we feel near to each other because we are near to Thee, the center of all love and of all hearts. Receive us into Thy hands; live this day by Thy wisdom in this people; keep even step beside us through all the journeyings of our days. Hear us as we continue to pray in the words Thy Son taught us:

Our Father which art in Heaven, hallowed be thy name; Thy kingdom come; Thy will be done in earth as it is in Heaven. Give us this day our daily bread; and forgive us our trespasses as we forgive those who trespass against us. And lead us not into temptation, but deliver us from evil: For thine is the kingdom, and the power, and the glory forever. Amen.

Dr. PEPPER. I have the pleasure of introducing the distinguished representative from Venezuela.

Dr. RIVEARO SALDIVA. It is with profound pleasure that I arise to express my great gratification in being privileged to attend this congress as a representative of Venezuela, with so many notable members of the medical profession gathered together for the exchange of thought on so many great and absorbing questions concerning the state of medicine in America and the world generally. After the close of these proceedings we will return to our respective spheres of usefulness imbued with

fresh ideas as to the treatment of disease which suffering humanity is called upon to endure. I take this opportunity of extending, on behalf of my Government and my country, our sincere thanks for the cordial invitation extended to us to participate in these proceedings, and offer our heartfelt congratulations on the success which has attended this meeting.

Dr. PEPPER. I have now great pleasure in introducing Mr. Ernest Hart, of London, who has been invited by the committee of arrangements to speak briefly upon some of the general interests of the medical profession in England and in this country.

Mr. HART. Mr. President, ladies and gentlemen: We are told traditionally that Ciest D. Cooper, one of the great surgeons of this century who divided the honor of modern surgery with Von Buren and others, and who remains with us not only as a model of a brilliant surgeon, but an accomplished gentleman, was in the habit of addressing every candidate for a degree from the college with which he was connected, something after the following manner: Gentlemen, you are about to enter upon a noble and difficult profession, and your success will depend principally upon three things: First, upon your knowledge; second, upon your continuous industry; and third, upon your moral character. Without the first, no one could wish you to succeed; without the second, industry, you will never be able to succeed; and without the third, strength of moral character, even if you do succeed, success can bring you no happiness. Now, those words might form a very adequate summary, a short text-book of the conduct, private dignity, and conduct in relation to public affairs of all medical men; and, one might very well ask, whether anything more than that is at all necessary, whether there is any necessity for a detailed and elaborate code when the whole philosophy can be summed up in so few words. And some do ask that question; and just now in our country, and I think to some extent in this, it has become a question as to just how far it is necessary to add to the simple rules of ethics, which govern the conduct of gentlemen, Christian gentlemen and honorable gentlemen in all professions. Is it necessary to add to this a detailed code of medical ethics? That question is one which has been solved. It was held in no doubt until these recent times. But, nevertheless, I think it is clear that never at any time, if there were a necessity for such a code, could that necessity be nearer and more apparent than at the present moment, for under the stress of a complex civilization with the keenest competition, and with the temptations and difficulties induced by the enormous facilities for advertisement, and with all the arts of those who make advertising a business, and the profit to tempt the medical man from the ancient bond of modesty and diffidence, there is now the strongest reason for fortifying every professional man by a code so precise, by deductions so exact, so comprehensive, and so far-reaching that he shall never be overcome by such temptations, but shall be able to know at once, and under

all circumstances, what is his duty, what is the rule of his profession in any one particular case in which he may be tempted. By possible excuses, which his vanity, his interests, his natural love of prominence suggests to him, he may be tempted to decide a doubtful case in his own favor and against the general good and welfare of the profession as a whole.

Now, I want to say that such a code as this does exist, and exists upon a logical and strong basis, exists for the benefit of the public, at least as much if not more than for the benefit of the profession; that it is not a trade's union business, it is not an elimination of public liberties and rights for the benefits of a private interest, but that it is, on the contrary, a movement which is made far more for the interests of the public in general than for the interests of the profession, and that applies not least but even more to those regulations of the medical code, which have from time to time been stigmatized by the public press as narrow and oppressive, and stigmatized as useless by those who call themselves the bolder and younger spirits among us. But not even the youngest among us, as you know, are infallible, and I think it is precisely the youngest and boldest which in this case are likely to go wrong. Now, first of all, let me remind you that the medical profession is only one of many professions. We have standing alongside of us the profession of law and the profession of the church. It is interesting, from a universal standpoint, to consider what is the code of the legal profession, why is that justified and how does it compare with the medical code? Just before I came to attend this congress I wrote some legal men concerning some details of the legal profession. One of them said: "After all the general spirit of a code may be summed up in a few words: That every practicing lawyer ought to be a gentleman and do only what is honest and honorable and fair to others, and, if he does not act like a gentleman and is not honest and honorable and true to his profession, honorable men ought to have nothing to do with him."

Now, you notice the deduction, that if he does not, honorable men of the profession ought to have nothing to do with him. That is precisely our position to-day. Questions in the bar and with the legal profession are strengthened by this, that the discipline of the bar is absolutely in the hands of the Attorney-General of England, and is decided without appeal by judges, so that any solicitor who is guilty, not only of any technical offense against his duty as a lawyer, but any solicitor who is guilty of anything which brings dishonor upon him as a gentleman is frequently not only temporarily suspended but subjected to deprivation of the right to plead or the right to practice his profession. My friend sent me a case which occurred last June, in which it was decided that a solicitor in a provincial town who had, in virtue of certain house property which he held, been a party to immorality, and used the house for immorality, and had left a stain upon his character as a gentleman, should be excluded from legal practice for a number of

years, subject to reinstatement upon proof of good conduct. So, the legal profession have a code far stricter than ours, but a code which every one admits is for the benefit at least as much of the public as of the profession. Now, let us take one or two other examples of legal etiquette. There are several things a lawyer must not do. One of these I was instructed in by an eminent lawyer with whom I spent a few days not long since. He may not conduct a speculative suit. That is to say, he may not conduct a suit in which his pay depends on the issue of the suit. Well, that looks like a restriction upon liberty. O, how that word liberty is licensed! Liberty is a blessed word, but compulsion is sometimes a more blessed word.

That looks like a restriction upon liberty, but if a lawyer is personally and financially interested in the result, and the case goes against him, he is angry with the judge and is apt to not do his duty, because it is his duty to see that justice is secured. So, although it looks like a restriction on the lawyer, it is only right he should have no financial interest in the cause he conducts. So with many other elements in the legal code of ethics, which I will not dwell upon. I will pass at once to the code of medical ethics, and I will ask you to consider whether you are of the opinion that you can safely cast aside all the precedents of past experiences, all that you may call the case law. Shall we reject the deductions which have been carefully and deliberately arrived at in respect to the applications to the medical life of the general principles of ethics?

For example, a medical man is prohibited from consultation with quacks. Now, in order to determine the meaning of the word quack, I have looked up Dr. Johnson's definition. "Quack—a boasting pretender to arts which he does not understand; a boasting pretender in physic; one who proclaims his own medical abilities in public places; an artful, tricking practitioner in physic." Thus you see there is no distinction between the quacks who have medical degrees and the quacks who have not. Another thing, no respectable physician should advertise. That is an essential of the quack. He is a person who seeks advertisement. This advertisement may be in the way of an interview by a representative of the secular press, or it may be by a published letter, by the description or criticism of some new alleged system of treatment, or it may be by divulging the secrets of the sick room and reporting without authority or permission the incidents and course of the illness of the distinguished or notorious somebody whom Dr. ——— is treating. Such arts are in direct contravention of medical ethics, and deserve the scorn and reprobation of every honorable person, as well as every honorable medical man.

It is in the interest of the public in general that the medical profession and every member of it shall be worthy of the confidence of the community, and that the physician shall earn his reputation, not by dishonest means, not by advertisement of himself or his books, not by

the prominence accorded to him by the journalists, but by the judgment of his colleagues as to his approved knowledge and in view of his conscientious and modest application of that knowledge. As to the rule which prohibits the medical man possessing or profiting by any secret remedy, not only is this an offense against professional morality but it is a source of great public danger as well. The physician owes his knowledge as well as his capacity for practicing medicine to the open communications of bygone practitioners, and daily he continuously receives such aid from his colleagues. Indeed it is to their published knowledge and experience that he owes the greater part of his means and ability of practicing his art. A new treatment, drug, or medical dogma is like a doctrine, dogma, or deduction in theology. The one is for the purpose of aiding the body for physical salvation, while the other is an aid to spiritual salvation.

From traditional law, and in virtue of the mission of the physician or priest, both are alike the common birthright of humanity, and any man who for profit keeps as a secret a new treatment or a new doctrine is a traitor not only to his profession but to all humanity. The physician who trades in or palters with secret remedies is untrue to his obligations, unfaithful to the world, a shame to himself, and a dishonor to his calling. It is only right that he should be treated accordingly under the professional code, and that he should not have a standing equal to the man who is true to his profession, true to humanity, and true to himself.

Nor can the alleged value of any so-called secret remedy be held to condone such an offense, for never in the whole history of mankind has there been one of these so-called secret remedies which when divulged or discovered by examination has proven of the least value.

Again, a medical man can not take charge of the patient of another without previous consultation and approval of the physician who previously had the case in hand, or rather under whose care the patient was at the time. A physician is prohibited criticising or advising a patient on any matter relating to another man's work, except under certain stated circumstances and conditions. The consultant is forbidden under any circumstances to take the place of the practitioner who called him in. All of this is as much, at least, and perhaps more for the public good than for the good of the profession and of the individual.

A resolution was then offered by Dr. Reed, concerning certain officials becoming ex-officio members of the international committee, which was passed.

The section on hygiene offered two resolutions, one concerning cholera and the other having to do with the Congress of the United States. They were read and referred to the international executive committee.

Adjourned.

FIFTH GENERAL SESSION.

SEPTEMBER 8, 1893.

Prayer by Rev. Byron Sunderland, D. D.:

O Thou Almighty and Eternal Jehovah, Father of angels and men, we know that Thou art a rewarder of all them that diligently seek Thee, for Thou has confirmed Thy faith in this by all Thy wonderful work in the world. Among us there has been all manner of disease and death, and Thou has raised up this new order and fraternity of men, and endowed them with the genius of sanitary power. Great are the labors of these servants, to whom Thou hast given so largely to apprehend the laws of life and health among mankind. We thank Thee, O Thou Father Almighty, for the gracious gifts to this great medical and surgical profession in all its departments, which has made its members so valiant against the mighty host of evil that has so long desolated our homes and caused so much suffering. Vast is the needful courage to cope with so many invisible, formidable, and deadly forces, and yet we pray Thee that thou may ever fill us with impulses which lead to new discoveries for the mitigation of human sufferings, and may they ever bear before their eyes that wonderful prediction, the last enemy that shall be destroyed is death. We thank Thee, O, Thou divine ruler and director of all things, that Thou hast made it possible to assemble here this Continental Congress in this great year of expositions. And now we invoke Thy special benediction upon all the officers and members of this great association, upon their families, their countries, their nations, and whatsoever they represent, both at home and abroad. Be ever gracious unto them, and do Thou abundantly abet their endeavor, that they may be able more and more to open the volume wherein are enfolded the sources of vigor and strength for the coming generation, and when they shall have seen the monuments of this land, and shared its hospitality, wilt Thou guide them, each and all, to their nations, that they may lead upon new researches, and that they may follow the lines of nobler triumph in the chosen work of their lives, and may the favor of the Almighty and Eternal God rest and abide upon each and all of them, now, and evermore, which we ask through Jesus Christ our Lord. Amen.

Dr. PEPPER. I have pleasure in introducing the distinguished representative of Honduras, Dr. F. C. Valentine, ex-surgeon-general of the army of Honduras.

Dr. VALENTINE. Mr. President, ladies and gentlemen: The president of the congress has kindly excused me from addressing you in the language of Honduras. He does that, I presume, under the impression that you know a little more English than you do Spanish.

In the name of the Republic of Honduras, I beg to thank you. I thank you because you remember that it exists; that it has a scientific being worthy of mention in a conclave like this; that it is not solely a land of gold, silver, precious stones, hides, mahogany, and rubber, commingled with volcanic upheavals and political revolutions. I say this not in deprecation of the writers, who must make their letters readable, because I am somewhat of a journalist myself—at least I am so called by newspaper men and women when they would flatter me.

But, to speak of Honduras itself. It is a small country with a large debt. For its acreage, the largest debt in the world. But the debt was not of its own making. People in the "mother country," from whence most of you sprang, pledged the building of a railroad to unite the Atlantic and Pacific oceans, and pocketed the money. Had North American enterprise undertaken the work, the road would have been built thirty years ago and the country enriched by development of vast natural resources.

You know, of course, that the finest sarsaparilla in the world grows in Honduras. And it was in Honduras that the *carica papaya* was first used as a digestive ferment. It may be transgressing the limits of modesty to tell you that a medical official of the army of Honduras was the first to prescribe the plant, whose juice, by dissolving the pseudo-membrane of diphtheria, enables us to save many little ones from a horrible death.

From the paucity of literature on Honduras, it may not be known to you that it is anything but a hot, unhealthy country. Within three hours' ride from either coast is a land of eternal spring, with an average temperature of 72°, and a diurnal variation of but five degrees between midnight and noon. There the strawberry and the orange ripen in June as they do in December; there one drinks water sterilized in the great workshop of nature, charged with carbonic acid gas so that it purls like the best champagne, vying in purity with the waters of the most noted spas in Europe.

There consumptives live without a hemorrhage or even a cough, and there Koch's bacillus need not be sought or feared. There asepsis need hardly be employed in surgery, for there the air is so pure that meat exposed to it remains unchanged interminably.

Honduras is proud that it was the first Latin-American country to adopt the North American system of education. Honduras was the first tropical country to institute absolute liberty of the press, life's post-graduate school. In consequence, it expects to emulate the United States in everything, save in the minor details of size. You read much of political disturbances and seismic convulsions in Honduras. During

the past thirty-five years there have been but four changes of government; one ex-President is now living abroad and another, after two consecutive terms of office, is farming in Honduras. This shows that the Presidential term in Honduras does not expire by bullets, but by ballots. And as to earthquakes and volcanic eruptions, not one has occurred for half a century. Yet Honduras is not recognized as fully as it merits. It will be as soon as this practically undeveloped land is placed within six days' travel of the port of New York, and that will be within less than twelve months. Then the glorious star-spangled banner will greet the modest white and blue of Honduras in brotherly salutation; then the greatest people in the history of mankind will know, and consequently reciprocate, the esteem in which it is held by its little sister; then science will accomplish another of its triumphs, the way being opened it by the first Pan-American Medical Congress.

REPORT OF THE INTERNATIONAL EXECUTIVE COMMITTEE.

The secretary-general read the report of the International Executive Committee as follows:

The International Executive Committee assembled, pursuant to call, at the Arlington, at 3 p. m., September 7. On invitation of the committee, Dr. Pepper, president of the congress, assumed the chair.

The following countries responded to the roll call by the presence of original members of the committee, viz., Argentine Republic, Dr. Pedro Lagleyze; Mexico, Dr. Tomás Noriega; United States of America, Dr. A. Vander Veer; Venezuela, Francesco A. Risquez.

The following countries responded by report of election to fill vacancies held by their respective representatives as follows, viz: British West Indies, Dr. John C. Phillipo; British North America, Dr. F. Montizambert; Costa Rica, Dr. Juan J. Ulloa; Guatemala, Dr. Juan Padilla; Haiti, Dr. V. L. Gilles; Peru, Dr. Manuel A. Muñiz; Republic of Colombia, Dr. Alfredo Garcés.

Proxies for the meeting were recognized as follows: United States of Brazil, Dr. Mauricio W. Gilmer; Honduras, Dr. Fred. C. Valentine; Spanish West Indies, ———.

The secretary-general presented the following resolution, adopted by the general session of the congress:

"*Resolved*, That the International Executive Committee be, and is hereby, requested to amend regulation 5 by adding the following provisions, viz:

"1. The general officers of the congress shall be *ex officio* members of the International Executive Committee until the next succeeding meeting of the congress. The president of the congress shall be *ex officio* president, the secretary-general shall be *ex officio* secretary, and the treasurer shall be *ex officio* treasurer of the International Executive Committee.

"2. The International Executive Committee shall have power to appoint standing committees to carry out the purposes of the congress, with the power to report *ad interim*. Such standing committees shall consist of an equal number of members for each constituent country or colony, or for so many of them as may be required for the object in view; shall be appointed by members of the International Executive Committee, each member making the required appointments for his respective country. Such committees may be appointed *ad interim* by members of the International Executive Committee, at the request of the *ex officio* president of that committee. Members of the International Executive Committee, upon the recommendation of the president of the committee, shall endeavor to have appointments made in accordance with this provision confirmed by their respective governments."

Dr. Montizambert (British North America) moved the adoption of the amendments. Seconded by Dr. Ulloa (Costa Rica). Carried unanimously.

The secretary-general reported the following as the present organization of the International Executive Committee for the Second Pan-American Medical Congress:

Argentine Republic.—Dr. Pedro Lagleyze, Calle Artes 46, Buenos Ayres.

Bolivia.—Dr. Emilio di Tomassi, Calle Ayacucho 26, La Paz.

British West Indies.—Dr. John C. Phillipo, Kingston, Jamaica.

British North America.—Dr. F. Montizambert, Quebec.

Chile.—Dr. Moises Amaral, Facultad de Medicina, Santiago.

Costa Rica.—Dr. Juan J. Ulloa, San José..

Dominican Republic.—Dr. Julio Leon, Santo Domingo.

Ecuador.—Dr. Ricardo Cucalon, Guayaquil.

Guatemala.—Dr. Juan Padilla, Guatemala City.

Haiti.—Dr. V. D. Gilles, Port au Prince.

Hawaii.—Dr. John A. McGrew, Honolulu.

Honduras (Spanish).—Dr. George Bernhardt, Tegucigalpa.

Mexico.—Dr. Tomás Noriega, Hospital de Jesus, Mexico.

Nicaragua.—Dr. J. I. Urtecho, Calle Real, Granada.

Paraguay.—Dr. ———.

Peru.—Dr. Manuel A. Muñíz, Lima.

Republic of Colombia.—Dr. Alfredo Garces, Popayan del Cauca.

Salvador.—Dr. David J. Guzman, San Salvador.

Spanish West Indies.—Dr. Juan Santos Fernandez, Calle Reina No. 92, Havana.

United States of America.—Dr. A. Vander Veer, 28 Eagle Street, Albany, N. Y.; Dr. Wm. Pepper, *ex officio* president, 1811 Spruce street, Philadelphia; Dr. Charles A. L. Reed, *ex officio* secretary, 311 Elm street, Cincinnati; Dr. A. M. Owen, *ex officio* treasurer, 501 Upper First street, Evansville.

United States of Brazil.—Dr. Carlos Costa, Rua Largo de Misericordia 7, Rio de Janeiro.

Uruguay.—Dr. Jacinto de Leon, Calle de Florida No. 64, Montevideo.

Venezuela.—Dr. ———.

Dr. Phillipo (British West Indies) moved the adoption of the foregoing as the organization of the international executive committee for the Second Pan-American Medical Congress. Seconded by Dr. Vander Veer (United States). Carried unanimously.

Dr. Vander Veer (United States) moved that the next Pan-American Medical Congress be held in 1896.

Seconded by Dr. Montizambert (British North America). Carried.

Dr. Reed (United States) moved that general regulation 8 be amended to read as follows:

"SEC. 8. The sections of the congress shall be as follows: (1) General medicine, including pathology and therapeutics. (2) General surgery, including orthopædic surgery. (3) Military and naval surgery and surgery of transportation. (4) Obstetrics, including gynecology and abdominal surgery. (5). Anatomy, including physiology. (6) Diseases of children. (7) Ophthalmology. (8) Laryngology and rhinology, including otology. (9) Dermtology and syphilography. (10) General hygiene and demography, including marine hygiene and quarantine. (11) Diseases of the mind and nervous system, and medical jurisprudence. (12) Dentistry. (13) Medical pedagogics."

Seconded by Dr. Muñiz (Peru). Carried.

Dr. Noriega (Mexico), on behalf of his colleagues of the delegation from that country, and on behalf of the general profession and the Government of Mexico, extended a cordial invitation to the committee to appoint the meeting of the Second Pan-American Medical Congress, to be held in the City of Mexico.

Dr. Montizambert (British North America) extended an equally cordial invitation

for the next Congress to be held in the city of Quebec, but stated that in view of the fact that the impression prevailed that the next meeting ought to be held in a Spanish-speaking country, he would not urge the invitation as warmly as he might under other circumstances.

On motion, duly seconded, the City of Mexico was unanimously selected as the place of meeting for the Second Pan-American Medical Congress.

The secretary-general here read the following resolutions, which had been adopted by the section on hygiene, climatology, and demography, and referred by the general session to the International Executive Committee for final action:

"No 1. *Resolved*, That in the opinion of the section on hygiene, climatology, and demography of the Pan-American Medical Congress the interest of the public health, in every country, should be and must be intrusted to a department of the government especially charged with their administration, and that, while the precise form of administration be left to legislation, the indispensable requisites are that it shall be national; that it shall have parity of voice and influence in the national councils; that it shall have independent executive authority under the limitations common to other departments, and that it shall be intrusted to educated and experienced medical men, who alone are competent to assume its responsibilities.

"No. 2. *Resolved*, That it is the sense of this section that in view of the prevalence of Asiatic cholera in Europe at the present time, and the constantly increasing number of foci of infection, immigration from European countries in which cholera exists should be temporarily suspended, as this action affords, in our opinion, the only certain means of averting a threatended invasion by the disease of the countries of the American continents. And be it further

"*Resolved*, That this resolution be reported to the general session of the Pan-American Medical Congress, with a request for its adoption and speedy transmittal to the executives of the several countries officially represented therein.

"No. 3. Whereas, in the language of a British journalist, 'greater energy and more systematic administration are much needed in regard to the sanitation of India, and England's imperial responsibilities in this matter are very heavy;'

"Whereas the question has been asked in Austria, Russia and France, 'You English have by your sanitary improvements prevented cholera from gaining a foothold in England, why do you not attack it in its birthplace and prevent it from spreading into life in India?'

"Whereas this question has been asked in America, 'Why should the whole civilized world be allowed to suffer through the constant dread of invasion or invasion itself of cholera on account of the religious fanaticism of the East?' Therefore, be it

"*Resolved*, That we respectfully submit to Her Imperial Majesty's secretary for India these recommendations:

"1. An imperial sanitary department attached to the Government of India.

"2. A provincial sanitary department attached to each of the provincial Governments.

"3. A local sanitary department.

"*Resolved*, That the secretary-general of this Government be directed to furnish a copy of this to Her Imperial Majesty's ambassador at Washington to be forwarded to Lord Kimberly, Her Majesty's secretary for India."

Dr. Vanderveer (United States) moved that the International Executive Committee considers it undesirable to take action upon the foregoing resolutions at the present time. Seconded. Carried.

The secretary-general read the following resolution from the section on hygiene, climatology and demography:

"*Resolved by the section on hygiene, climatology and demography*, That the Congress of the United States of America be most earnestly requested to cause a large edition of the very valuable report of Dr. Edward O. Shakespeare, of Philadelphia,

of his researches on cholera, to be printed for distribution among the several countries represented in the Pan-American Medical Congress."

Dr. Vanderveer (United States) moved the adoption of the resolution. Seconded Carried.

Dr. Owen (United States) moved that the secretary-general be requested to print on a prominent page in the transactions the following:

"*Resolved*, That the International Executive Committee, on behalf of the Pan-American Medical Congress, disclaims responsibility for the views expressed by any individual contributor to its proceedings."

The secretary-general read a resolution which had been adopted by the section on hygiene, climatology, and demography, upon motion by Dr. Ulloa (Costa Rica), urging that the congress take active steps to secure the adoption of a uniform set of quarantine regulations for all of the countries and colonies of the Western Hemisphere.

Dr. Ulloa (Costa Rica) urged the adoption of the resolution.

Dr. Reed (United States) stated that in view of the fact that the committee had already established the precedent of declining to take action on matters calculated to interfere with the administrative policy of the constitutent countries, and for the purpose of carrying out at once the meaning of the second amendment to regulation 5, as well as conforming to suggestions made by President Pepper, he offered the following, which would, in a measure, meet the purposes not only of the resolutions which had been sent in from the section on hygiene, climatology, and demography, but would supplement actions which were known to have been taken in other sections. He therefore presented and moved the adoption of the following:

"*Resolved*, That in conformity to general regulation 5, as amended at this meeting, the International Executive Committee hereby authorizes the appointment of the following International American committees, viz:

"(1) A committee, consisting of one for each constituent country and colony, whose duty it shall be to formulate a series of quarantine regulations which shall at once furnish the maximum of protection to public health with a minimum of interference to commerce, and shall be acceptable to each of the American countries and colonies. It shall be the further duty of each member of such committee, when such quarantine regulations shall have been formulated, to secure, as far as may be practicable, the appointment, by his respective government, of at least one delegate to an international American quarantine conference, vested with treaty-making powers, to which conference the regulations previously agreed upon shall be submitted for formal adoption. Each member of this committee may, at his discretion, appoint such coadjutors resident in his respective country or colony as may be required to carry out the purposes of the committee.

"(2) A committee, consisting of one person for each constituent country or colony, whose duty it shall be to investigate the expediency of formulating a Pan-American Pharmacopœa, and, if found expedient, to proceed with the work. Each member of this committee may, at his discretion, appoint three coadjutors resident in his respective country or colony.

"(3) A committee, consisting of one member for each constituent country or colony, whose duty it shall be to investigate and report upon the medicinal qualities of the flora of the various American countries. Each member of this committee may, at his discretion, appoint three coadjutors resident in his respective country or colony.

"(4) A committee, consisting of one member for each constituent country or colony, whose duty it shall be to cooperate with the object of placing the care of the public health in charge of experienced and educated medical men and to secure the establishment in each of the several governments of a department of public health with parity of voice and influence in national and colonial councils and with independent executive authority under limitations common to other departments in the same government. Each member of this committee may, at his discretion, appoint such

coadjutors resident in his respective country or colony as may be required to carry out the purpose of this committee.

"(5) A committee, consisting of one member for each constituent country and colony, whose duty it shall be to investigate and report upon a plan to secure the adoption of a uniform or equivalent course of instruction in medicine in each of the several American countries, and to secure the reciprocal recognition in law of graduates in medicine from each of the American countries who shall have graduated from institutions exacting the requirements of such uniform or equivalent course of instructions. Each member of this committee may, at his discretion, appoint two coadjutors resident in his respective country.

"*Resolved*, That the *ex officio* president of the International Executive Committee shall appoint the president of each of the foregoing committees from among those appointed as members of the same, and that the president of each committee shall appoint the secretary of his respective committee from among either the members or the coadjutors of the same.

"*Resolved*, That the foregoing committees shall be governed by the following general rules, viz:

"(1) Each committee shall have power to prosecute to a conclusion the work assigned to it.

"(2) Any member of either of the committees may report progress at any time through the medical press, providing that in making such report he shall sign the same officially as "Member of the committee on ——— of the Pan-American Medical Congress, for ———."

"(3) Copies of any or all reports thus published, or of records of work accomplished, shall be forwarded at once by the member making the same as follows: One copy to the president of the respective special committee and one copy to the *ex officio* secretary of the International Executive Committee.

"(4) The president of each committee may at his discretion prepare and publish, officially, a summary of the reports of progress of his respective committee in the several countries and colonies.

"(5) The president of each committee shall prepare a final report of the detailed work of his respective committee, and submit the same to the Second Pan-American Medical Congress.

"(6) The *ex officio* secretary of the International Executive Committee shall preserve the original copies of all reports transmitted to him officially by members of the foregoing special committees and shall file the same with the archives of the First Pan-American Medical Congress in the library of the Surgeon-General's Office at Washington. He shall prepare a brief summary of the work of all the foregoing special committees, and of such additional committees as may hereafter be appointed, and shall submit the same, in connection with the report of the *ad interim* work of the International Executive Committee, to the Second Pan-American Medical Congress."

The adoption of the resolutions was seconded by Dr. Montizambert (British North America). Carried by unanimous vote.

Dr. Muñiz (Perú) moved that the appointment of members of these committees be deferred until the members could return to their respective countries to take counsel regarding the appointments which should be transmitted as soon as made to the secretary-general who should promulgate the lists as soon as completed. Seconded by Dr. Gilles (Haiti). Carried.

Dr. Vander Veer (United States) moved that the address of President Pepper be published in pamphlet form under the auspices of the International Executive Committee in advance of the publication of the transactions, and that it be published in the transactions in the English, Spanish, and French languages.

Dr. Ulloa (Costa Rica) moved that the following resolution be reported for formal adoption by the general session, viz:

"*Resolved*, That the thanks of the Pan-American Congress be, and are hereby, tendered to the President of the United States for his cordial cooperation in promoting the interests of this congress; to the Congress of the United States in adopting a joint resolution and in appropriating funds by which the present successful meeting was held under the auspices of the National Government; to the Surgeon-Generals of the Army, Navy, and Marine Hospital Service respectively, for courtesies extended in their official capacities; to the general officers of the Congress and to the officers of sections for their devotion to the success of the Congress; to the committee of arrangement and their respective subcommittees for the delightful entertainment of the members, and to the press, medical and lay, for its cordial support of the congress from its inception, and for its careful reports of the meetings now drawing to a close."

Dr. Montizambert (British North America) seconded the adoption of the motion. Carried by unanimous vote.

Adjourned *sine die*.

WILLIAM PEPPER,
Ex officio President.

CHARLES A. L. REED,
Ex officio Secretary.

Dr. L. I. McMurtry (United States) moved that the report of the International Executive Committee be adopted. Seconded by Dr. Francisco A. Risquez (Venezuela). Carried unanimously.

Dr. J. C. Phillippo, Kingston, Jamaica, then spoke on behalf of the foreign members as follows:

MR. PRESIDENT, LADIES AND GENTLEMEN: It is with considerable diffidence that I rise before you on this occasion to return the thanks which are due to you for the kindness with which you have received the members of the foreign delegation in this, your magnificent city. I have talked with several of them from the isles of Cuba and Hayti, and Mexico, and find they cordially unite with me in returning to you their thanks for your kindness and hospitality, which to them has flavored almost of perhaps too much kindness in some instances, but always an invariable amount of fellowship and good feeling.

Gentlemen, I do not want to make a long speech on this occasion, but I can not leave you without recalling to mind that in this year you are celebrating the discovery of America by the great Christopher Columbus. I have heard some people say they are tired of Christopher Columbus. But I am sure that those who think properly and quietly over the matter will always remember the life of that great man with feelings of veneration and esteem. Columbus discovered this continent and gave to Castile and Leon a new world. I do not think that he ever dreamed that in discovering this New World he would give to the world a mighty nation. This mighty nation has arisen, springing from the first men who came here, good, wise, faithful, conscientious men, men who were persecuted in their own countries and who found in the barren rocks of Plymouth homes where they planted their standard, and did more than Christopher Columbus to create this mighty nation. And this mighty nation, thus established, has folded in its arms the

struggling and oppressed masses of Europe. You have here amongst you people from every nation, people who claim and look to the United States of America as their mother and their friend.

But gentlemen, if Christopher Columbus gave to Castile and Leon a new world, the United States has given the world a mighty name, a man who, greater than any other man, stands unrivaled in the history of the world. In talking of Christopher Columbus, I have heard but little of that man, who from my earlier years I have almost worshiped. I refer to that man who was said to be first in war, first in peace, and first in the hearts of his countrymen. You all know to whom I refer, to George Washington, whose name has been given to this city of great and magnificent distances. It stands as a monument to him who helped to found this great Republic; and, when I think of Washington, I remember how he, like Christopher Columbus, suffered during his lifetime through the jealousy of his friends. But, his name is now imperishable; no other name stands in the history of the world to compare to that of George Washington, and there are few cities in this world that can compare in beauty and magnificence with this city, in which we are now meeting.

As I look upon the emblems of peace that surround us, I can not refrain from calling to mind the condition of Europe, where the roll of the drum and the clank and the tramp of warlike men is heard, while pestilence and famine are ravaging the people, and thousands and hundreds of thousands are dying, and I thank God this Pan-American Congress has met in this place. When I think of these things, I remember that though all these nations are ready to go to war, and there are men ready to be let loose like the sleuthhounds, and they are devising all the ingenious schemes for the destruction of their fellowmen, war comes but rarely. Pestilence and famine we hear of, and they carry away hundreds of thousands, but their visitations are infrequent. But, there is a greater foe than these; there is a foe that lives and dwells in every civilized country; there is a foe that lives almost in every home. I mean ignorance, and superstition, and immorality. Ignorance of hygiene causes the death of one third of the human race in earlier infancy. And, now, it is for this great association, in this country, where there is no need of standing armies, to devote all energies to the alleviation and to the prevention of disease and to the rescue of those infants who are thus annually slaughtered.

I hope and trust that this Pan-American Association will live and thrive for years, and that the association will soon see the time when human life will be held more sacred than it is. I think I can almost hear the ancient seer crying out, "Watchman, what of the night? Watchman, what of the night?" The night is far spent and the day is at hand, the morning star arises in the East, the nations shall no more

war against nations; kings shall be nursing fathers and queens nursing mothers; governments, instead of warring and fighting, instead of seeking to increase the number of their fighting men, shall seek for the perpetuation of human life, for how much better it is to save life than to destroy it! Those are the words of our veteran poet and physician, the autocrat at the breakfast table. His word is our law, and I hope the autocrat will once more tune his harp and give us an ode to the Pan-American Association.

And now I must conclude. I fear I have taken up too much of your time. And if we shall meet again in three or four years I presume it will be in the halls of Montezuma, which, for so many thousands of years, have been a monument of the early power and talent of men. But in taking farewell of you on this occasion, my friends of the Pan-American Association, I can only say that I and all the foreign delegates are delighted to have met you. You have been only too kind to us; you have made us think more of ourselves than we ought, and if we remained much longer we would think so much of ourselves we would not care to go away. And now I bid you farewell. Farewell.

Dr. PEPPER. We have enjoyed very much the coming of several European gentlemen of distinction, and it gives me great pleasure to present to you Mr. Ernest Hart, of London, who will respond on behalf of the European guests.

Mr. ERNEST HART. Mr. President and gentlemen: No task could be happier or more welcome than that of expressing to you, on behalf of those whom I represent, especially on behalf of the British guests of this congress, our sense of deep admiration of the great thought which inspired it, and of the remarkable success with which a most difficult task has been carried out. With the thought which stimulated those who convened this congress, British physicians must especially be in sympathy. First, because the principle of scientific association passing beyond the barriers of nationality has always been a leading thought and a constant method of action in Great Britain, and nothing has ever given us greater pleasure than to welcome, for the last century, visitors from this great continent to our annual scientific conventions.

One great imperial object dear to the heart of every resident in Great Britain and of all the British colonies and dominions, is the desire for the confederation of all useful and benevolent public purposes of the English-speaking race. We are doing everything in our power to promote it in our sphere by advancing what is known with us as imperial confederation. That is to bring together for common purposes of good all the dominions, colonies, and empires in which the English language is spoken within the range of British Government. This Pan-American confederation is, I hope, a step, and by no means the first step, and not, I hope, the last step, for the confederation of all the British-speaking and foreign-speaking races upon this great American Continent. And we may claim to have this much of a share in it, to show how close is

the relation of the American with the British race, that even in this Pan-American Congress you necessarily include British America, British West India, and a large number of British subjects, whom you claim justly as Pan-Americans. So, here, we can claim that British and Americans stand shoulder to shoulder in the successful promotion of science. I thank you most heartily and most sincerely for the kindness with which you have entertained your foreign guests.

Dr. PEPPER. We have accepted the cordial invitation of the Republic of Mexico as the place of the next meeting of this congress, and I have the honor to present Dr. Lavista to respond for that country. (Spoke in Spanish; remarks not furnished.)

CLOSING REMARKS BY THE PRESIDENT OF THE CONGRESS, PROF. WILLIAM PEPPER, M. D., LL. D., PHILADELPHIA, PA.

Finally, members of the Pan-American Medical Congress, it remains only for the society to adjourn; it is not *sine die*, but to a date. This date is left in the hands of the International Executive Committee, and the reason it is not definitely fixed in 1896 or 1897—for no one suggested an earlier date than three years—was because the date of the next European congress can not be settled until after the meeting in Rome in April. If that congress shall then decide to adopt the new schedule, meeting in 1894, 1897, etc., it would be better for us to meet in 1896, but if it meets in 1896, possibly it would be to the interests of this congress to have the meeting in 1897. So, too, doubtless the season chosen will be one which will render the visit to that country most satisfactory. This congress completes, apparently, the needful organization of these continents, and of the profession of this entire hemisphere. We are all determined to stand by it and develop it with all our power. This congress constitutes the great American democratic confederation of our profession, and, with the sister society, the association of England, it is to go hand in hand.

We have evidently developed the need of a number of special societies, and these have come to meet once in three years, a body of specialists limited in their work. Now, it seems there is need for this larger body, supplementing, complementing, and I think we may hope completing, the organization; so we now have a body which apparently has a very different function from any of the others, because it has become the organic link between all the governments of this continent and the profession, and for the first time there is this organic relation created. The remarkable courtesy of the governments where the International Congress has met, and the presence of royalty have given grace to the occasion, but it has never met under the auspices of a joint resolution of Congress and the official invitation of the President, as has the first Pan-American Congress. This has been from the start the central conception, and I think the main impulse, in this whole movement, that we were creating a new mechanism, which if allowed to grow by its own

inherent merit would demand the respect of nations, and would come to have a most important organic official relation with these governments. Thus it would seem this Pan-American Congress has completed the union of the profession of this continent by its immediate success, and by the warm sympathy which we have all felt toward it. Think, this year, with the very successful meeting of the American Medical Association, with the attractions at Chicago, with the uncertainty of the congress at Rome, and the financial stringency, and yet we have had countless expressions of sympathy, for we have had the strongest and most cordial testimony of those who have spoken, as well as of many others, stamping with approval this Pan-American Association.

So, my brethren of this first Pan-American Congress, in adjourning it I feel we have consummated an important step in the progress of American science. For the unfailing courtesy extended to me, and for the charming cordial relations which have in all instances existed between the officers of the congress, I can not express sufficient thanks. All sorts of blunders have been made, but we have all overlooked them. Everybody has apparently been standing by his brother; there has not been for a moment the slightest feeling or divergence of opinion, but only work for the advancement of our profession. Dr. Reed was initiative, and it is only right I should speak of the incessant work, and of the cooperation of all those connected with the organization. I have, then, only to say farewell, thanking you for the courtesy extended to us, and asking you to join with the International Executive Committee with the determination that we do not intend to allow it to go down, and with a determination to secure the continuous influence and the growth and the strength of the Pan-American Medical Congress in all future years.

Farewell.

PART II.

SECTIONS OF THE CONGRESS.

SECTION I.—GENERAL MEDICINE.

Honorary presidents.

Dr. Manuel Carmona y Valle, City of Mexico.
Dr. Francis Delafield, New York, N.Y.
Dr. Israel F. Dunn, Portland, Me.
Dr. Reginald H. Fitz, Boston, Mass.
Dr. J. O. Hirschfelder, San Francisco, Cal.
Dr. Henry M. Lyman, Chicago, Ill.
Dr. Alfred L. Loomis, New York, N. Y.
Dr. Emilio Martinez, Havana, Cuba.
Dr. William Osler, Baltimore, Md.
Dr. John A. Ouchterlony, Louisville, Ky.
Dr. William Pepper, Philadelphia, Pa.
Dr. F. Peyre Porcher, Charleston, S. C.
Dr. G. Isaac Ugarte, Santiago, Chile.
Dr. Armando Velez, Lima, Peru.
Dr. H. A. West, Galveston, Tex.
Dr. James C. Wilson, Philadelphia, Pa.
Dr. Carlos E. Bernhard, Tegucigalpa, Honduras.
Dr. J. J. Cornilliac, St. Pierre, Martinique.
Dr. Henry Hun, Albany, N. Y.
Dr. Guzman, Nicaragua.

Executive president.

Dr. Victor C. Vaughan, 15 S. State street, Ann Arbor, Mich.

Secretaries.

Dr. Judson Daland (English-Speaking), 317 S. Eighteenth street, Philadelphia, Pa.
Dr. Güemes (Lavalle 869), Buenos Aires, Argentine Republic.
Dr. A. A. de Azevedo Sodré, Rio de Janeiro, United States of Brazil.
Dr. Moorehouse, London, Ontario.
Dr. A. J. Williams, Georgetown, British Guiana.
Dr. John Fullock, Tobago, Trinidad, West Indies.
Dr. Ignacio Gutierrez Ponce (2 Rue Pierre Charron 2), Paris, France (for Republic of Colombia).
Dr. Martin Bonnefille, San Jose, Costa Rica.
Dr. J. Carreau, Point à Pitre, Guadeloupe, French West Indies.
Dr. Ramon L. Miranda (Spanish-Speaking), 439 W. Forty-sixth street, New York, N. Y.
Dr. Samuel González, city of Guatemala, Guatemala.
Dr. Arch. Désert, Port au Prince, Haiti.
Dr. G. P. Andrews, Honolulu, Hawaii.
Dr. Rómulo Colindres, Comayagua, Honduras.
Dr. Basilio Marin, Leon, Nicaragua.
Dr. Vincente B. Valdés (Teniente Rey 104), Havana, Cuba.
Dr. Enrique Figari (Uruguay 190), Montevideo, Uruguay.
Dr. Francisco A. Rísquez, Caracas, Venezuela.
Dr. Demetrio Mejía (San Andrés 12), City of Mexico, Mexico.
Dr. G. E. Pierrez, Antigua, British West Indies.

ADDRESS BY THE PRESIDENT, VICTOR C. VAUGHAN, M. D.,

Professor of Hygiene and Dean of the Department of Medicine and Surgery, University of Michigan, Ann Arbor, Mich.

THE PRINCIPLES OF IMMUNITY AND CURE IN THE INFECTIOUS DISEASES.

GENTLEMEN OF THE SECTION ON GENERAL MEDICINE OF THE FIRST PAN-AMERICAN MEDICAL CONGRESS: I wish to extend to you a hearty greeting, and to thank you for your presence and for the interesting and valuable papers which many of you have prepared, and which will make the work of this section worthy of the profession of the New World.

In opening the labors of this section, I have decided to bring before you for your consideration a theory concerning the principles of immunity and cure in the infectious diseases. I shall at first discuss the question of immunity and shall then endeavor to ascertain the differences, if there be any, between the fundamental principles upon which immunity is secured and those by which cure may be brought about.

Upon the subject of immunity many valuable contributions have been made, and theory after theory has been proposed. Both the researches and the theories have their value, that of the former being permanent and that of the latter consisting principally in suggestions that stimulate and systematize investigation. The value of a theory does not wholly depend upon its truth, but is rather to be measured by the fruitfulness of the lines of investigation that it opens. Indeed, a theory may be wholly erroneous and yet it may lead to most important discoveries.

It is not my purpose to assail or even to discuss the theories concerning immunity that have heretofore been brought forward, but to suggest one that, in my opinion, will harmonize the results already attained by scientific workers, and which, I hope, will lead to other investigations.

Immunity may be natural or acquired. Natural immunity may be peculiar to the species or race, or to the individual. An example of natural immunity is that of the domestic fowl to anthrax. As has been shown by Lazarus and Weyl, the chick, even at the time of coming from the shell, is immune to the most virulent culture of the bacillus anthracis. It is true that this animal may be made susceptible to anthrax, but this is an artificially-induced susceptibility. The immunity is natural to this bird at every period of its life. Another example of racial immunity is that of the frog to anthrax. This animal can also be rendered susceptible, but again it is true that the susceptibility is artificial and the immunity is natural. Racial immunity must be inherent in the parent cell.

The natural immunity, which is peculiar to the individual, usually comes with adult life. The young are susceptible to a given disease, but adults of the same species lose this susceptibility and become immune. The young rat is susceptible to anthrax, while the adult is naturally immune, but can be rendered susceptible by exhaustive exercise. The child is highly susceptible to scarlet fever and diphtheria, while the adult, though not wholly immune to these diseases, loses very much in susceptibility and is likely to become infected only when greatly reduced in vitality or after prolonged and aggravated exposure to the poison. The only reasonable explanation of this immunity is that it is inherent in the parent cell and comes on as naturally as do the changes in form and voice at puberty or the growth of the beard in early manhood. The evolution of the condition of immunity in these cases is due to the natural development of the functional activity of certain cells of the body. The cause of the difference in the effect of the anthrax bacillus on the young rat and that of the same germ on the adult rat exists in the rat and not in the bacillus. A child and an adult are exposed to the Löffler bacillus from the same source; the former becomes infected, the latter does not. The germ is the same, but in the development that converts the child into the adult, the resistance with which the

germ must contend has been strengthened. The immunity that comes with adult life must be due to altered cell activity.

Ehrlich has shown that immunity from poisoning with the vegetable proteids, abrin, ricin, and robin, is transmitted from the mother to the fetus and retained by the latter for more than a month after birth, when it is quickly lost, and that the second generation fails to show any immunity. He concludes that there are two kinds of immunity: One he designates as active, the other as passive. The immunity that he found to be transmitted, as already stated, from mother to child he classifies as passive, and thinks that it is due to the transmission of ready-formed antitoxins from the mother to the child and that these antitoxins being soon eliminated the immunity is lost. In active immunity he supposes that the body has acquired the property of manufacturing the antitoxins, but upon this point he is not clear. He also demonstrates that immunity may be transmitted from the nurse to the child, even when the latter is not the offspring of the former and has come from a highly susceptible mother.

This division of immunity into an active and a passive form is convenient and plausible, but Ehrlich's active immunity must be cellular in origin. Can any chemical products be elaborated in the animal body except by the activity, either direct or indirect, of cells? The most earnest opponent of vital energy—which now means cellular activity—admits that the active principles of the digestive juices are the products of specialized glands, and even the absorption of the products of digestion, which we once believed to be effected in accordance with the comparatively simple laws of osmosis, is now known to be dependent upon cellular activity. But can it be said that the temporary immunity that is transmitted from mother to child or from nurse to nursling is of cellular origin? The mother and the fetus are physiologically one, and the same is true of the nurse and the nursling. The blood of the mother flows through the fetus, and the products of the cells of the nurse feed the nursling.

Ehrlich made six experiments, in which it was found that the offspring of an immune father and a susceptible mother did not possess even a temporary immunity, and this forms another reason for his belief that immunity is humoral; but Tizzoni and Cattani have shown that an immunity to tetanus artificially induced in the sire is transmitted, though lessened in degree, to his offspring, although the mother remains susceptible; and Tizzoni and Centanni, that a like immunity to rabies may be transmitted from father to offspring. If these statements be true the humoral theory of immunity must be modified so that the noncellular elements can be considered as inducing immunity only by their effects upon the cellular elements. As is claimed by Ehrlich immunity transmitted from the mother to the offspring may be explained by supposing the introduction into the latter from the former, through the fetal circulation or through the milk, of immunity-conferring substances in soluble form; but in the transmission from father to children we can conceive only of the idea that the immunity must reside in the cellular elements of the spermatic fluid, because our knowledge of fecundation teaches us that the head of the spermatozoön fuses with the ovum and produces the child.

Artificial immunity may be induced by either of the following methods:

1. By an attack of the disease, ending in recovery. Until the discovery of Jenner this was the only known cause of immunity, and even at present it is supposed to be, as far as man is concerned, the most potent cause. However, we now know that the period of time through which immunity thus obtained holds good has been overestimated. A man may have smallpox the second time, provided several years have elapsed since the first attack, and provided the second exposure brings him in contact with a highly virulent form of the infection or the exposure continues through an unusually long period or happens at a time when the health is much reduced from any cause. Moreover, the period of immunity conferred by an attack of some of the infectious diseases is so short that many have reasonably questioned its existence.

It is true, I believe, that the more grave and virulent the disease may be, the greater and more persistent is the immunity that follows. I mention this in order to call attention to the fact that there is a quantitative relation between cause and effect in the production of immunity. Please bear in mind that in this method of inducing immunity the substance of the germ itself is introduced into the body. This method found a practical application in inoculation for the prevention of small-pox.

2. By vaccination with a modified and less virulent form of the infection or by the introduction of at first a very small number of the virulent germs and successive inoculations with larger numbers.

The successful inoculations against chicken cholera and anthrax made by Pasteur consist in vaccination with a modified germ, and the valuable investigations of Emmerich and his students in immunizing certain animals to swine erysipelas have demonstrated the results that may be obtained by employing the virulent germ first in small numbers and then gradually increasing the dose. Again, it may be observed that the germs themselves are introduced into the body, and again it is also true that the more potent the cause the greater and more persistent the effect. The immunity that follows inoculation with a germ of full virulence is more marked and extends through a longer period than that which is induced by a vaccine.

3. By one or more treatments with sterilized cultures of the germs.

Immunity against the germs of typhoid fever, cholera, diphthera, tetanus, hog cholera, and several other diseases, has been secured by one or more treatments with sterilized cultures of these germs. An interesting question arises in this connection: What constituent of the sterilized culture is it that confers immunity? All will agree that it is not due to the ptomaines that are present in some of the cultures. Another important class of substances present in these sterilized cultures contains the so-called toxalbumins, and to these we may possibly look for the cause of the immunity.

The teaching of some of the German investigators is that each pathogenic germ produces both toxins and a special immunizing substance. This is a very convenient theory. It supposes that each germ, while elaborating its harmful products, also produces a substance that will prevent its growth. Please bear in mind that this theory is wholly different from that which teaches that the germ may be finally killed by its own products. We know that many living things, both vegetable and animal, are killed by their own excretions, when the latter are allowed to accumulate about the former, but the theory of the production of a special immunizing substance by each specific germ is wholly different from this. The theory teaches that the germ produces a substance that confers immunity against itself and that the object in the production of this body is to confer the immunity. If we should find in nux vomica a substance that would render animals insusceptible to the action of strychnine, this fact would be analogous to the theory of the formation by each germ of a specific immunizing agent. This theory certainly presupposes a foresight and kindness on the part of the deadly germs of diphtheria and other infectious diseases which we hardly expected to find.

Fraenkel states that the toxic and the immunizing substances produced by the diphtheria germs are two distinct bodies, the former being destroyed by a temperature of from 55° to 60° C., while the latter will bear a temperature of 70° C. or higher. He recommends that the cultures, sterilized by filtration through porcelain, be heated to from 66° to 70° C. and then be used in the production of immunity. However, he admits the possibility that the toxic substance may be converted into the immunizing body by the effect of the heat in lessening the virulence of the former, and there are many reasons for believing that this is the true explanation.

Brieger and Wassermann produced in guinea pigs a certain degree of immunity from cholera by previous treatment with bouillon cultures of the germ heated to from 65° to 80° C. Shall we conclude from this that the cholera germ elaborates a

special immunizing substance? Wassermann has shown that the immunizing substance in sterilized cultures of the comma bacillus is contained in the germs themselves and is identical with the specific proteid poison of this germ. In other words, the substance that in larger doses kills, in smaller doses gives to the animal immunity from the living germ.

I think that we can answer the question as to which constituent of sterilized cultures gives immunity with considerable confidence if we recognize the following facts:

(1) Marked artificial immunity to an infectious disease has not been obtained except by the introduction into the animal of the germ substance, either inclosed in the cell wall or in solution.

(2) Sterilized cultures contain the germ substance in one or both of these forms.

(3) The same immunizing substance exists in the bodies of bacteria grown on solid media and killed by the action of chloroform.

(4) The same immunizing effects, varying, however, in degree, are obtained with the bodies of dead bacteria morphologically intact or in solution, with living bacteria modified and reduced in virulence, and with very small numbers of the virulent germ.

With these demonstrated facts before us, I am ready to believe that the immunizing substance is a constituent of the bacterial cell itself; and as each kind of germ has its own peculiar poison (which in small doses confers immunity), this poison can not come from the cell wall; nor is it really a split product of the germ's action, but it is the essential characteristic part of the cell—that part which gives to the germ its distinctive properties. I believe that it is the nuclein.

The three methods of inducing immunity which we have mentioned reduce themselves to one and the same principle, i.e., the introduction of germ-nuclein into the body.

The immunity that results from an attack of the disease is caused by the introduction of germs, living and more or less virulent; that which comes from vaccination is due to the introduction of germs, living but modified and reduced in virulence or administered in small quantity; that which is secured by one or more treatments with sterilized cultures is secured by the introduction of germ nuclein so modified that it is no longer capable of reproducing itself.

Understood in this way, the production of immunity from disease becomes analogous to that which Sewall obtained with the venom of the rattlesnake, and Ehrlich with ricin and abrin.* Indeed, the venom of snakes, the poisonous vegetable proteids, abrin, ricin, and robin, and the cellular proteids of the pathogenic germs, have many characteristics in common. All are proteids, intensely poisonous; they lose their poisonous properties on being boiled in aqueous solution; different species of animals vary in their susceptibility to these poisons; they are much less poisonous when given by the stomach than when injected hypodermatically (the difference in the amounts necessary to produce fatal effects when administered by these different avenues being much greater than with either the vegetable or the putrefactive alkaloids). The immunity which is secured by all of these substances is gradually lost. A further resemblance between the vegetable and the bacterial poisonous proteids is to be found in the fact that immunity to one of these substances obtained from a given source does not confer immunity to another from a different source. An animal rendered immune to ricin is still susceptible to abrin, and one rendered immune to tetanus remains susceptible to diptheria. Whether or not an animal made immune to the venom of one species of poisonous snake would still be susceptible to the venom of another species is not, so far as I have any knowledge, known.

The immunity obtained by Brieger, Kitasato, and Wassermann by inoculating

* Ehrlich tells us that one gram of ricin would be sufficient to kill one and one-half million guinea pigs. The poison of tetanus can scarcely be more virulent.

with cultures grown in thymus-bouillon is due to the same principle that governs in the methods already discussed. Immunity was secured by the introduction of a modified bacterial proteid, the lessened virulence of the poison being due to a certain constituent of the thymus extract. The nature of this constituent of the thymus gland will be discussed later. That the tetanus germ is physiologically modified by its growth in the thymus-bouillon was demonstrated by the fact that it failed to produce spores in this medium, as well as by its diminished virulence.

Behring rendered about 40 per cent of the animals experimented upon immune to tetanus and diphtheria by previous treatments with small amounts of cultures to which iodin trichlorid had been added. This is also most probably due to the fact that the chemical compound modified the bacterial proteid. Behring himself gives this explanation. He also states that it is a matter of indifference whether he employed cultures containing bacteria or those that are germ free. By the latter he means cultures in which the germs have been deprived of their vitality or from which they have been removed by filtration. In either case the cell proteid of the germ is present either in the form of cells or in solution, and this cellular proteid is the agent that induces immunity.

(5) By treating a susceptible animal with the blood serum of an immune animal.

Strange as it may seem, the principle upon which immunity is secured when the blood serum of an immunized animal is injected into a susceptible one is essentially the same as that which holds good in the methods already discussed. A horse is rendered immune to tetanus by previous treatment with the modified bacterial proteid of that disease. As a result of these treatments a tetanus antitoxin is generated in some organ or organs of the horse and circulates in its blood. When the blood clots this antitoxin is found in the serum, and if the serum be injected into a mouse in sufficient quantity this animal becomes for the time being immune to the tetanus poison, provided that the poison is not introduced in quantities so large that it will not be destroyed by the antitoxin that has been brought over from the horse.

The immunity actually does not belong to the mouse. It still belongs to the horse. It is stolen property, and will soon be lost. The cells of the horse, not those of the mouse, make the antitoxin. The mouse for the time being becomes physiologically a part of the horse, and it is by virtue of this relationship that the former is for the time being immune to tetanus.

The quantity of blood serum that must in this supposed case be transferred from the horse to the mouse in order to give immunity to the latter will depend upon the relative weight of the animals and upon the degree of immunity possessed by the horse; and the degree of immunity induced in the mouse will be governed by these same factors.

Subsequent inoculation of the mouse with the tetanus nuclein, in order to prove its immunity, may awaken the cell activity of this animal, and then the immunity belongs to the mouse; but this is not true before the introduction of the germ. Behring has understood this point and has given this explanation.

We have seen that in all cases the cause that brings into existence the condition of immunity is a bacterial proteid. Now, in order that this inciting cause may induce the condition of immunity, it must act upon something. We say that it acts upon the animal, but with this general statement we can not be satisfied. Upon what organs of the body does it act? This question can be answered only tentatively at present, and the answer is founded upon the fact that we suspect that certain organs are acted upon, because certain results follow. Certainly, the cell activity of the invaded host must be altered. The cells upon whose altered activity immunity depends are probably those of the spleen, the bone marrow, the thyroid and thymus glands, and possibly other glandular organs. As already stated, this answer, which it may be noticed is given with reserve, is founded upon inference rather than upon direct demonstration. However, experimental evidence on this point is not wholly wanting.

The disastrous effects that follow the removal or atrophy of the thyroid gland, and the wonderful alleviation following the treatment of myxedema with extracts of this gland, are now well known to every member of the profession. These facts show that this gland must furnish an antitoxin, which is essential to the preservation of health and life. Lindemann has shown that the normal dog will bear doses of caffein which can not be borne by the same animal after extirpation of the thyroid. Tizzoni and Cattani have found that rabbits from which the spleen has been removed can not be immunized to tetanus.

These facts, together with others to be mentioned further on, render it altogether possible that the organs mentioned are concerned in the production of immunity.

Here an interesting question arises: In what way are these organs concerned in the production of immunity? Do they elaborate antitoxins, and if so, what can be said about the nature of these antitoxins? These are questions in which I have been deeply interested for some time, and which I have attempted to solve. In this attempt I have borne in mind the fact that these organs are the sources of the nucleated white blood corpuscles. Do these corpuscles contain a germicidal or antitoxic substance; and, if so, what is its nature? They differ from the red corpuscles in being nucleated, and, from all other tissues in containing proportionally larger and more numerous nuclei. The chief chemical constituent of nuclei is a substance called nuclein, some of the general properties of which are known to physiologic chemists. Can it be that nuclein is the germicidal or antioxic substance? Have the nucleins in general or as a class any germicidal action? As methods of isolating the nucleins are known, this question can be answered by experimentation. But before we begin with our experiments we will ascertain whether or not we can find that any such properties have ever been observed in the nucleins. I find that others have thought of the possibility that the nucleins may play a role in the production of immunity. In their very valuable paper, Ueber Immunität und Giftfestigung, Brieger, Kitasato, and Wassermann have the following to say:

With the idea that the highly vitalized leukocytes or lymphocytes are concerned in the destruction of bacteria within the body, and that antitoxin substances are formed by the breaking down of these cells, we began our experiments with the best known and relatively most thoroughly studied decomposition-products of the white blood-corpuscles, the nucleins and the nucleinic acids, which we had prepared directly from pus. Later, Prof. Kossel had the goodness to make like preparations for us from pus and yeast, for which we again give him our best thanks. Cholera-cultures served us for the most part in these investigations. However, we found neither a decrease in the toxicity of these cultures on being treated with the nuclein bodies, nor could we render animals proof against the poison by previous treatment with cholera-cultures to which nuclein had been added.

A priori, these negative results were probable because the preparation of the nucleins and nucleinic acids requires such powerful chemical manipulations that the resulting substances could only be such as would be devoid of all active energy. Moreover, we knew from previous researches with the bacterial poisons how susceptible similar compounds are to apparently indifferent chemicals, like alcohol, ether, etc. * * * Therefore, we concluded to prosecute our studies with simple, aqueous, feebly alkaline extracts from organs rich in cells.

Having reached these conclusions, Brieger and his coworkers proceed to make their investigations with a feebly alkaline extract of the thymus gland.

This is the only instance, so far as I know, in bacteriologic literature, up to the time of the first publication of my results, in which anyone has even suggested that the nucleins might be germicidal or in any way concerned in the protection of the body against bacterial invasion, either in the production of immunity or in effecting a cure; and it must be admitted that this reference did not afford much encouragement to my theory. However, I was not altogether discouraged, because certainly no one should expect to find a highly active nuclein in pus-cells, the nuclein of which in the very formation of pus has been altered, probably more deeply and destructively than would result from "the apparently indifferent chemical reagents, alcohol and ether." As these German investigators failed to tell how the yeast nucleinic acids

with which they experimented had been prepared, the hope was left to me that in this might rest the explanation of their failure. This hope found support in the fact that in the preparation of their thymus extract they heated it to 100° C., and certainly this temperature must have had quite as much effect in depriving the living nuclein of its energy as indifferent chemical reagents could have had. The fact that they obtained the results which they did with this extract after it had been heated to 100° is an evidence of the power originally possessed by the nuclein of this gland, for I think that it must be admitted, from the results which I have obtained, that the active agent in the thymus extract with which Brieger and his coworkers experimented is a nuclein.

At first I tried to prepare an active nuclein from compressed yeast, but the results were not satisfactory. Compressed yeast contains a large amount of water and starch. The large proportion of the first-mentioned constituent caused a very small yield of nuclein, and there were many difficulties in this complete separation of the starch. There were, however, two other and more serious objections to the use of compressed yeast. The first of these is due to the fact that such yeast contains bacteria to begin with, and the task of preparing an active nuclein from it is similar to that of obtaining the same substance from pus. The second difficulty lies in the fact that compressed yeast contains many dead cells, and an active nuclein can be obtained only from living, healthy cells.

Next, I attempted to prepare an active nuclein from the ordinary brewer's yeast. But I found this also contaminated with bacteria.

At last, I was supplied, through the kindness of the Ann Arbor Brewing Company and through Dr. Laasche, of Chicago, with unlimited quantities of pure cultures of yeast, without cost, and my thanks are due to the manager of the company named and to Dr. Laasche for this material.

With the aid of Drs. McClintock and Novy I have succeeded in preparing active nucleins not only from yeast, but from several organs of the body as well, and as the further elaboration of the principles of immunity and cure in the infectious diseases depends so closely upon the action of these nucleins, I must be permitted to go somewhat into detail concerning their preparation, their chemical reaction, germicidal properties, and physiologic effects:

Yeast nuclein.—The cells from pure cultures of yeast are washed with sterilized water, then treated with a 5 per cent solution of potassium hydrate, and filtered through paper (the Falten filter paper of Schleicher and Schull being used for this purpose). Sterilization of the filter paper is not necessary. The filtrate is feebly acidified with hydrochloric acid, and the proteid precipitated with 96 per cent alcohol. The precipitate is washed with alcohol by decantation until the supernatant fluid remains colorless. The precipitate is then collected upon a filter, and, after all the alcohol has passed through, it is dissolved in very dilute potassium hydrate (0·25 to 0·50 per cent). That this solution contains other proteid bodies besides the nuclein is shown by the fact that it promptly responds to the biuret, xanthoprotein and Millon reactions, but notwithstanding these impurities, solutions of nuclein prepared in this manner have markedly germicidal effects.*

A purer form of yeast-nuclein may be obtained by digesting out the other proteids from the alcoholic precipitate with hydrochloric acid and pepsin, in the manner which will be described in the preparation of animal nucleins.

The following experiments, in which the impure nuclein-solution was used, will illustrate its germicidal effects. In all cases the nuclein-solution was diluted with sterilized normal salt-solution, then placed in quantities of 5 c. c. in sterilized test-tubes, inoculated with the germs mentioned in each experiment; and plates made after varying intervals of the time show the germicidal effects. In making the plates, a platinum loop of constant size (with a diameter of 2 millimeters) was employed.

*In fact, this is a nucleo-albumin rather than a nuclein.

In the first four experiments, 2 c. c. of a 0·25 per cent alkaline solution of nuclein, containing 0·9 milligram of impure nuclein per cubic centimeter were diluted with 3 c. c. of normal salt solution, inoculated with the germ, and plates made as follows:

EXPERIMENT I.

Staphylococcus pyogenes aureus.

Time	5 minutes.	1 hour.	2 hours.	14 hours.	23 hours.
Number of colonies	1,110	0	0	0	0

EXPERIMENT II.

Staphylococcus pyogenes aureus.

Time	5 minutes.	1 hour.	2 hours.	14 hours.	23 hours.
Number of colonies	1,490	20	0	0	0

The strength of alkali in this dilute nuclein-solution, not taking into consideration the fact that some of the alkali is absorbed by the nuclein, is 0·1 per cent. The culture of the aureus used in these experiments grows abundantly in a 0·5 per cent aqueous solution of potassium hydrate.

EXPERIMENT III.

The same solution nuclein as the preceding inoculated with the staphylococcus pyogenes albus.

Time	Immediate.	20 minutes.	1 hour.	2 hours.	17 hours.	24 hours.
Number of colonies	680	0	0	0	0	0

EXPERIMENT IV.

The same solution of nuclein, inoculated with the bacillus anthracis without spores.

Time	Immediate.	20 minutes.	1 hour.	2 hours.	17 hours.	24 hours.
Number of colonies	45	0	0	0	0	0

The total amount of impure nuclein in the 5 c. c. of dilute solution employed in these experiments was 1·8 milligram, or the strength of the solution was 1 part of impure nuclein to 2,777 parts of water.

EXPERIMENT V.

The 5 c. c. used in this experiment contained 10 milligrams of impure nuclein dissolved in 0·1 per cent of potassium hydrate. The germ was the aureus.

Time	Immediate.	30 minutes.	1 hour.	3 hours.	5 hours.	24 hours.
Number of colonies	Countless.	5,000	550	490	400	0

Many other experiments similar to this were made, but as the results were uniformly the same, repetition is unnecessary.

EXPERIMENT VI.

A loop of tuberculous sputum, showing from forty to sixty bacilli in each field when stained, was stirred up in beef tea, allowed to stand for twenty-four hours, and injected into the abdominal cavity of guinea pig No. 1. Another loop of the same sputum was added to a solution of 30 milligrams of impure yeast nuclein in 0·08 per cent of potassium hydrate, and this was also allowed to stand in the incubator at 38° for twenty-four hours, and then injected into the abdominal cavity of guinea pig No. 2.

At the expiration of fourteen days both of these animals were killed. The omentum of No. 1 was a tuberculous mass throughout, while No. 2 showed not the slightest evidence of the disease.

The solutions of impure nuclein in dilute alkali may be kept at ordinary temperature in glass-stoppered bottles for months, without undergoing putrefactive changes. I have now one bottle of such solution, which was prepared on the 20th of December, 1892. One hundred and fifty milligrams—possibly a much larger quantity—of

this nuclein may be injected, when properly diluted, under the skin, without any inconvenience, save slight pain at the time of injection and some soreness in the part, which disappears after a few hours. The last statement is true when the initial dose is small and the quantity is gradually increased. In one case, in which I gave an initial injection of 25 milligrams, an erysipelatous redness, as large as a saucer, appeared in a few hours. The temperature went up 3° and the patient felt some nausea. The redness, however, rapidly disappeared, the temperature fell, and two days later I repeated the same dose without any ill effects. In some other instances I have noticed an elevation of temperature within an hour or two after the injection. This has happened only in those patients in which the size of the dose has been rapidly increased. Yeast nuclein appears at times to have a cumulative action. When employed in large doses for several consecutive days the temperature may be markedly elevated.

Testicular nuclein.—I have prepared this from the testicles of the bull, dog, guinea pig, and rat. The testicles are stripped of their investing membranes as soon as removed, rubbed up and extracted repeatedly with a mixture of equal volumes of absolute alcohol and ether. Then the testicular substance is digested for some days (until the supernatant fluid fails to respond to the biuret test for peptones) at 40° C. with pepsin and 0·2 per cent hydrochloric acid. The undigested portion, which contains the nuclein, is collected on a filter paper and washed first with 0·2 per cent hydrochloric acid, then with alcohol. Finally it is dissolved in a 0.5 per cent solution of potassium hydrate and filtered through a Chamberland filter, without pressure.

This solution is clear, more or less yellow, and feebly alkaline. On the addition of nitric acid a white precipitate forms and dissolves colorless in the cold on the further addition of nitric acid. This nuclein does not give the biuret reaction, but does respond to the Millon test. The nitric acid solution of the precipitate becomes yellow on the addition of ammonia.

This nuclein also has germicidal properties, as is demonstrated by the following ments:

EXPERIMENT I.

A solution of nuclein of unknown strength, obtained from the testicles of a bull, was diluted with 4 volumes of physiologic salt-solution, inoculated with the bacillus anthracis, and plates made, with the following results:

Time	Immediate.	30 min.	1 hr.	2 hrs.	3 hrs.
Number of colonies	730	6	0	0	0

EXPERIMENT II.

The same solution inoculated with the aureus.

Time	Immediate.	30 min.	1 hr.	2 hrs.	3 hrs.
Number of colonies	Countless.	2,850	0	0	0

EXPERIMENT III.

A solution of nuclein from the testes of a dog diluted with 4 volumes of salt solution and inoculated with the staphylococcus pyogenes aureus.

Time	Immediate.	20 min.	1 hr.	2 hrs.	17 hrs.	24 hrs.
Number of colonies	680	0	0	0	0	0

EXPERIMENT IV.

Another solution from the same source diluted in the same manner and inoculated with the aureus.

Time	5 min.	1 hr.	2 hrs.	14 hrs.
Number of colonies	250	0	0	0

EXPERIMENT V.

As several authors have reported the finding of a germicidal substance in the glycerin extract of certain organs, the following experiment was made: The testicles

of a white rat were stripped of their tunics and extracted with glycerin. This extract, diluted with 4 volumes of salt solution and inoculated with the aureus, gave the following results:

Time	5 min.	1 hr.
Number of colonies	1,240	75

I have used this solution of nuclein in doses of from 5 to 20 drops, diluted with saline solution, hypodermatically in one case of nervous exhaustion, and from the markedly stimulant effects observed I conclude that it is to the testicular nuclein that the Brown-Séquard fluid owes its action. These effects, as I have observed them, with the very small doses given, soon pass away, but they are extraordinary.

Thyroid nuclein.—The fresh gland is cut into fine pieces, extracted with alcohol and ether, and then digested with pepsin and 0·2 per cent hydrochloric acid at 40° for two or three days, the digestive fluid being renewed several times and the digestion being continued until the supernatant fluid fails to respond to the biuret test. The undigested residue is collected upon a filter, washed with 0·2 per cent hydrochloric acid, then with alcohol and ether, and finally dissolved in 0·25 or 0·5 per cent solution of potassium hydrate.

This solution of nuclein gives a faint opalescence on the addition of nitric acid. It does not color on heating with nitric acid, but becomes markedly yellow on the further addition of ammonia.

A 0·25 per cent alkaline solution of this nuclein dissolved with an equal volume of physiologic salt-solution and inoculated with the aureus showed a germicidal action as indicated in the following figures:

Time	Immediate.	10 min.	1 hr.	20 hrs.
Number of colonies	805	830	256	0

I have not tested the effects of this nuclein on man.

Egg nuclein.—The yolk (2 dozen eggs furnish a convenient amount of material to work with in the laboratory) is extracted with absolute alcohol repeatedly and until all the coloring matter is removed. The substance is then digested for some days with pepsin and 0·2 per cent hydrochloric acid. (In one instance I continued this digestion for four weeks, hoping to obtain a residue which would not respond to the biuret test, but this desire was not attained.) The undigested portion is collected on a filter, washed with dilute hydrochloric acid and subsequently with alcohol, and then disolved in 0·25 or 0·50 per cent of potassium hydrate and filtered through porcelain.

This solution of egg nuclein is colorless or slightly yellow. Nitric acid produces a slight, white precipitate, which dissolves in excess; this does not turn yellow on heating, but does so beautifully on the subsequent addition of ammonia.

EXPERIMENT I.

A solution of this nuclein in 0·25 per cent potassium hydrate was diluted with 4 volumes of saline solution, inoculated with anthrax, and the following figures show the germicidal results:

Time	Immediate.	30 min.	1 hr.	2 hrs.	3 hrs.
Number of colonies	2,490	350	30	0	0

EXPERIMENT II.

Another portion of the same dilution, inoculated with the aureus, gave the following results:

Time	Immediate.	30 min.	1 hr.	2 hrs.	3 hrs.
Number of colonies	Countless.	2,000	137	0	0

Besides the foregoing sources, I have obtained nucleins from the brain and the spleen, and these also are germicidal in their action. I have not tested the physiologic effects of the nucleins from the egg, brain, or spleen on man. I have employed the egg nuclein on guinea pigs without any apparent deleterious effects.

I have introduced this sketch of some experimental work, illustrating a few of the many experiments that I have made bearing on this point, for the purpose of

giving some correct idea of the ground upon which I make the assertion that nucleins are powerful germicides.

I think that all will now agree with me that the nuclein-forming organs of the body most likely have some concern in the production of immunity.

The nucleins formed by these cells or in these organs pass into the blood partly in solution and partly in the form of the multinuclear white corpuscles—the so-called phagocytes.

The germicidal properties of blood serum are due to soluble nucleins. This statement rests upon work done by McClintock and myself, and the evidence upon which it is founded will be set forth in a paper to be read before this section.

There are three reasons (only one of which has heretofore been recognized) why the germicidal properties of blood serum are greater than those of blood plasma. These are: (1) The lessened amount in the serum of those substances that favor bacterial growth; (2) the concentration in the soluble nucleins that occurs as a result of clotting of the blood; and (3) the passage of the substance of the multinuclear cells into solution.

When I speak of the solution of the substance of the multinuclear cells I do not wish to commit myself to the theory that the entire cells break down. I refer simply to the fact—and I believe it to be a fact, as I have found nuclein in solution in blood-serum—that the nuclein passes from the cell into solution. Whether this process is due to the breaking down of the cell or to an active secretion on the part of the cell, I am as yet unable to determine.

As is claimed by Metschnikoff, there are obvious advantages to the animal in having the germicidal constituents of its blood (partly) in the form of ameboid bodies. Concentration at a desired place can be more easily accomplished and the walls of the arteries and other tissues may be traversed without injury. But these cells do not eat and digest the invading bacteria. There are reasons for believing that they have no power to retard the progress of the invading bacteria until the constituents of the cells pass into solution. Germs often grow and multiply in these cells.

The fact mentioned by Metschnikoff, as a proof of his theory, that in the apyretic stage of relapsing fever all of the spirilla are found in the splenic cells, while in the pyretic stage they are free in the blood, is capable of a wholly different explanation from that which he attributes to it. It seems to me more likely that the spirilla seek the interior of these cells as a place of rest, where they reproduce themselves, and from which they go forth with renewed energy. In the monkey the splenic cells fail to afford this protection, and the pyretic stage does not return. Metschnikoff himself states that the malarial hematozoön, during the ameboid stage of its existence, finds its way into the corpuscle, and from the substance of this the parasite takes its nourishment.

The action of the soluble or alkaline nucleins on germs may be either inhibiting or directly toxic, or both. It is not necessary that the invading germ be killed in order to prevent it producing disease. If its growth and multiplication be inhibited the disease will not follow. Metschnikoff has shown that some of the germs taken even after many days from the local abscess formed in an immune animal inoculated with a pathogenic germ, and injected into a susceptible animal, may cause the disease. These nucleins are not only germicidal; they are also toxicidal. They render inert the bacterial nuclein, whether this be present in living or dead cells, whether it be in suspension or in solution.

In order to state my views upon immunity in a condensed form, and to bring this address within the limits of the time allowed, I will summarize as follows:

There must be three factors in the production of immunity in an animal naturally susceptible. First there must be an inciting or immunizing substance introduced into the body. We are acquainted in a rough manner with the nature of some of these substances, such as the venom of the snake, the vegetable proteids, abrin, ricin and robin, and certain bacterial proteids. I call these proteids, and I wish

it to be understood that I do so tentatively, and that I recognize the fact that the exact chemical nature of none of them is known; but for the present we may call them proteids. For reasons already given, I believe that these proteids, which induce immunity, belong to the class of nucleins. I am aware of the fact that physiologic chemists do not always classify the nucleins among the proteids, but among the albuminoid bodies. These substances, be they nucleins, proteids, or albuminoids, have the property, when introduced into the bodies of certain animals, in certain amounts and under certain conditions, of so stimulating the activity of certain organs in the animal that these organs produce and supply to the blood an antidote to the substance introduced.

Secondly, the organs whose activity is stimulated by these immunizing agents are those, such as the spleen, thyroid gland, and bone marrow, which manufacture nucleins.

Thirdly, the antidotal substance is a nuclein. The kind and amount of nuclein formed will depend upon the nature of the inciting agent and the condition of the organ or organs acted upon.

I use the word "nuclein" in a broad sense, including the true nucleins, nucleinic acids, and nucleo-albumins. By the term "nuclein" I mean that part of the cell which under normal conditions is endowed with the capability of growth and reproduction, which assimilates other proteids and endows these assimilated substances with its own properties. It is that part of the cell which gives it its individuality. Whether these nucleins, while in solution and devoid of morphologic unity, are still capable of assimilating allied bodies or not, can not at present be positively determined. There is no *a priori* reason, so far as I know, for denying this. These different nucleins, that of the bacterial cell, and that of the blood, may be isomeric bodies, one of which may be designated as the α compound, and the other as the β compound, and one of these, by simply causing a rearrangement in the atoms within the molecule of the other, may assimilate the second. There are some good reasons for believing that certain proteid bodies contain a cyanogen group, and Kossel has shown that nuclein contains a basis substance, adenin, which has the formula $C_5H_5N_5$ and is a polymer of hydrocyanic acid, and Gautier has synthesized another constituent of nuclein, xanthin, by simply heating hydrocyanic acid in a sealed tube in contact with water and a little acetic acid. Indeed, the readiness with which cyanogen bodies polymerize is well known to chemists. Thus, liquid chlorid of cyanogen CNCl converts itself spontaneously, under certain conditions, into solid chlorid of cyanogen, $C_3N_3Cl_3$; cyanic acid into cyilid; methyl cyanic ether, $CON(CH_3)$ into methyl cyamin ether, $C_3O_3N_3(CH_3)_3$, and cyanogen into paracyanogen.

I do not mean to say that the process by which a nuclein assimilates another proteid is as simple as would be indicated by these examples, but they may suggest something of the nature of the chemistry of assimilation. We may suppose that when an alpha nuclein and a beta nuclein are brought together, one will assimilate the other; and which one will absorb the other will depend upon the relative strength or vitality possessed by them, and in measuring this strength several things must be taken into consideration. A vaccine has less of this power of assimilation than a germ of full virulence, and a nuclein in a sterilized culture less than either of the others.

An organ that has once been stimulated by a given excitant responds more quickly the second time to the same excitant, provided that the interval of time is not too great. This explains the gradual loss of acquired immunity.

Again, an organ that is stimulated by one excitant may not be responsive to another, and this accounts for the fact that an animal rendered immune to one disease remains susceptible to another.

The poison that is introduced is destroyed by the activity of certain cells. In order, however, to accomplish this destruction, it is probably not necessary that the poison should come in contact with the cells. For instance, the activity of the

spleen has been found necessary, as the experiments of Tizzoni and Cattani have shown, to the production of immunity to tetanus. We can suppose that the process of immunizing an animal proceeds in something like the following manner: The modified virus of tetanus is introduced into some distant part; in some unknown way, the spleen is stimulated to action, and secretes a nuclein which is carried partly in solution, partly in the form of multinuclear cells, to the invaded part of the body, and the tetanus poison is converted into the nuclein coming in contact with it, or is otherwise rendered inert. Later a larger quantity of the tetanus poison is introduced, and now the spleen acts more promptly and energetically than before. This promptness and energy of action are increased by exercise, and finally an amount of tetanus-culture, of full virulence sufficient to kill an animal whose spleen has not been subjected to this training, may be introduced without ill effect. On this theory the production of immunity consists in a special education of certain cells, and artificial immunity becomes essentially cellular.

The difference between immunity and tolerance I conceive to be this: In the former the cells of certain organs become aggressive; a special function is developed; the poison introduced is destroyed. In tolerance, there is no aggressive action on the part of any organ; there is no development of special functions; the poison introduced is not destroyed; it only fails to kill.

Now, what can be said about the relation between the principles of immunity and those of cure? Are they the same? I think that there are essential differences. In the first place, the substances with which immunity is induced are not applicable in the production of a cure. They are already in the body, and have failed to stimulate the nuclein-forming cells in such a manner as to cause their own destruction. To introduce more of the bacterial poison after the invading virus has established itself in the system will only strengthen the invader. No disease, after being well developed, has been cured by the administration of the bacterial poison. I believe that vaccination, first performed after exposure to smallpox, may altogether prevent the development of the disease, or may modify it, but this is not cure. Of what service would vaccination be when the body is already covered with smallpox pustules.

Some experimenters have found that if a certain substance be introduced into the animal simultaneously with, or a few minutes, or at most a few hours, after the introduction of the virulent germ, the disease either does not appear, or it appears later than it does in control animals, and they have claimed that these are instances of cure. Thus, Behring speaks of *curing* diphtheria in guinea-pigs with iodin trichlorid. He injected this "curative agent" immediately after inoculation, and at the place of inoculation, and found that, of the animals thus treated, some, although they sickened, did not die. He may have induced immunity in this way by the action of the chemical agent on the bacterial proteid, though this has been experimentally denied by Tizzoni and Cattani, but certainly such results do not deserve to be designated as cures.

Koch attempted to cure tuberculosis by introducing the proteid of the specific bacillus into patients. Theoretically this was a mistake, because this proteid in living, virulent form is already present in the patient, and, indeed, is the cause of the disease. Immunity to tuberculosis has been tested by nature in each tuberculous person and has been found wanting. Some step in the process has failed. Either the poison was first introduced into the body in a form too virulent to be resisted, or the cells of the body have been unable to act with normal energy.

If I am right concerning this difference between the agents of immunity and cure, to what source shall we look for curative substances in the infectious diseases? Either we must introduce into the body some germicide formed by other cells, or we must employ other agencies for the purpose of stimulating the nuclein-forming cells. Blood-serum therapy offers the first of these alternatives, and now that we know that the germicidal constituent of the blood is a nuclein, blood-serum therapy will

give place to nuclein therapy, and with the latter there is more hope of accomplishing good results, because it reduces the size of the dose.

I say that the germicides from which we now hope for good results in treatment must be of cellular origin. The experience of the medical profession for the past twenty years has demonstrated that there is no known chemical substance which can be introduced into the animal body in sufficient quantity to effect a cure by its germicidal action without harm. Time after time the discovery of a nonpoisonous, powerful germicide has been announced, but experience has invariably shown either that the substance is poisonous or that it is not germicidal. This universal experience of the profession has been scientifically demonstrated to be a fact by the researches of Behring, who after a large number of experiments came to the conclusion that, computed on the body weight of the animal, antiseptic substances reach a fatal dose when injected in absorbable form under the skin in one-sixth the amount which is necessary to prevent the development of the anthrax bacillus in the blood serum.

Now that we have learned that the animal body itself generates a germicide more powerful in its action than corrosive sublimate, and since we know how to increase the amount of this substance in the blood, and can isolate it, and inject it into other animals, renewed hope comes to us.

I have stated that one advantage which nuclein therapy will have over blood-serum therapy is to be found in the fact that it may enable us to employ the active substance in larger doses. We have seen all along that quantity as well as quality must be taken into consideration in the production of both immunity and cure, and that the effects are in proportion to the quantity. Even the ultra-bacteriologist does not now claim that a single bacillus of the most virulent kind introduced into the most susceptible animal will cause disease. The animal body is no longer to be regarded as a mere culture flask, in which germs grow without meeting with the slightest resistance; and after the germs of tuberculosis have gained the ascendancy, and are multiplying by the millions daily, possibly hourly, we need not hope to find a tuberculin which in doses of the fraction of a milligram will, within a few days, or within any period of time, destroy this great mass of living, growing poison. The miraculous effects of small doses need not be looked for. These will have no place in the therapy of the infectious diseases.

If it be possible to kill the germs or destroy the bacterial poison after the development of an infectious disease by the introduction of a germicide or a toxicide formed by other cells than those of the infected person, then we may expect that cures for diseases of this kind will be found in the near future. Experimentation offers the only means of ascertaining whether or not this be possible. The recently reported cases of tetanus successfully treated with the antitoxin of Tizzoni and Cattani, obtained from the blood of animals which have been rendered immune to this disease, are in accord with this principle.

If nuclein therapy fails us, we must strive to find agents that will stimulate the nuclein-forming glands. This probably is the chief factor in the climatic treatment of tuberculosis, but so far as our knowledge of medicinal substances that will accomplish this result goes we are practically and wholly ignorant. The field of special cellular therapeutics lies before us a *terra incognita*. Important discoveries in this direction are not likely to be made soon.

I have used the word "cure," limiting its meaning to the destruction of the germs or other poison. If we could destroy all of the bacilli in the body of a tuberculous patient would a cure be effected? If we ever reach this desideratum nature will probably do the rest.

I have thus imperfectly placed before you certain ideas that have for some years been slowly formulating in my mind. They have enabled me to demonstrate, first, that the nucleins are powerful germicides, and, secondly, that the germicidal constituent of blood serum is a nuclein. Whether or not they will lead to further elucidation of the perplexing problems of immunity and cure I can not predict.

PAPERS READ BEFORE THE SECTION.

THE TREATMENT OF GOUT.

By JAMES TYSON, M.D.,

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That there can be no rational treatment of gout without a correct understanding of its pathology is evident. It can not, on the other hand, be claimed that the pathology of gout is thoroughly understood, although all admit that many facts bearing on it are well determined. One of these is that uric acid is in some way causative. Whether, however, the uric acid thus responsible is the result of increased formation or diminished excretion, or both, is not so generally acknowledged. Thus, Garrod, whose work first published in 1859, is to-day regarded as one of the classics in medicine, held that there is no increased formation of uric acid in the gouty, but a diminished excretion which results in an accumulation in the blood and other fluids of the body, and that this is true of almost every phase of gout. This Garrod showed by his well-known thread test.

Although the methods of analysis employed by him were not those acknowledged at the present day to be the most reliable, the more recent work of Pfeiffer, conducted in accordance with modern methods, essentially confirms the original statements of Garrod.

Thus Pfeiffer,* using Salkowski's method, determined the uric acid in the urine of certain cases of gout, of which he made two classes. Of these the cases of the first category had not passed over into the chronic stage—that is, had not acquired changes, such as stiffness of the joints, gouty tophi, atheromatous blood vessels, and the like—but had suffered acute attacks with intervals of complete freedom from symptoms. The second category included cases which had undergone the changes referred to. His results he contrasted with those of the urine of healthy men at corresponding periods of life, as follows:

In Class I, in which the urine of the exempt period was examined, the quantity of uric acid in the twenty-four hours per 100 kilos of body weight was—

Age.	In gouty subjects.	In healthy men.
	Gram.	*Gram.*
30 to 40	0·885	0·965
40 to 50	0·818	0·882
50 to 60	0·701	.....
60 to 70	0·651	0·752

It will be seen that it was less in the gouty subject than in the healthy man in Class I.

The same was true of the urea, which amounted to only 28·8 grams in gouty subjects for each 100 kilos of body weight instead of an average of 33·1 grams for each 100 kilos in the healthy man, observations being made on men from from 33 to 65 years old.

Thus it will be seen that in the urine of such cases in the intervals between attacks there is a very decided diminution in the quantity of uric acid eliminated, as compared with persons in health.

* Pfeiffer, ueber Harnsäure und Gicht, Berliner klin. Wochenschrift, No. 17, Apr. 25, 1892, 5, 415.

Class II.—In those in whom chronic gouty changes had established themselves Pfeiffer noted a somewhat different result. Thus while the average elimination of uric acid in a healthy man from 33 to 45 years old was ·860 gram, that of the gouty subject between 33 and 65 years amounted to ·973 and even more, while the ratio of the urea to uric acid, which was 33·7 for the healthy person, amounted for the gouty to 35. Thus in this class of cases, the gouty with chronic changes, there is an increased excretion of uric acid as compared with health. This is a reversal of the original results of Garrod who found in the urine of this class of gouty subjects no uric acid at all, or only traces. This is ascribable to defect in the older method of analysis, that of Heintz by hydrochloric acid. It is now known that this fails to get out the whole of the uric acid.*

It will be seen, however, that the difference in favor of increased excretion is very slight, while the average excretions in the two classes of cases between 35 and 73 years old is still a trifle less than in the non gouty, being ·855, as compared with ·860, while the urea is also somewhat less, being 31·3 instead of 33, the ratio of urea to uric acid being 36 to 1 as contrasted with 38·5.

Now, if we turn to another modern observer, Alexander Haig,† who used also Salkowski's method for the determination of uric acid, and whose work seems to have been done with unusual care, we find his studies entirely confirm the original results of Garrod. Haig claims that there is "almost never" an excessive formation of uric acid at any time, and that its accumulation in the blood and body at any time is generally due to retention or failure of excretion; that uric acid is on the whole continuously formed in the proportion of 1 to 33 of urea. In certain states of the blood constituted essentially by increased alkalinity uric acid is held in solution in larger quantity constituting uric acidæmia. At such times, too, it is eliminated in increased quantity by the urine by which it is also readily held in solution because of the alkalinity of this secretion.

In opposite states of the blood the uric acid is driven out of this fluid and deposited in the tissues of the joints. Haig holds also that these opposite conditions, which are fluctuations in secretion only, can be artificially produced by drugs, food, temperature and other conditions influencing the reaction of the blood. Thus alkaline foods and warm weather favor the former, while acids and cold weather favor the latter and it is under influences like these that uric acid in the shape of urates is stored up in the body. He further says‡ that the blood never becomes loaded with uric acid except as the result of previous imperfect excretion, and such imperfect excretion or retention is sufficient to account for the largest quantities he has ever seen in the human body, and that there is no need of excessive formation as an explanation. Further, that he does not assert that excessive formation never occurs, only that he has never met any conclusive proof of its occurrence, while all the other phenomena of disease can be explained without postulating the excessive formation of a single grain.§

The result is, however, the same. Whether there be diminished excretion or increased formation, or both, there is an accumulation of uric acid in the blood which is responsible first for certain premonitory symptoms of gout, and second for

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* Pfeiffer says that this indisposition of uric acid to be thrown down on the addition of hydrochloric acid, formerly regarded as characteristic of gout, becomes more marked as age advances, and may be said to be almost the rule with persons over 60. "Possibly," says P., it may present itself earlier in gouty subjects than in the normally constituted."

† Uric Acid as a Factor in the Causation of Disease. By Alexander Haig. London. 1892.

‡ *Op. cit.*, p. 7.

§ Notwithstanding these observations it is not unusual to find even medical men under the impression that gouty subjects excrete much more uric acid than the healthy, an error probably due to the fact that the urine of gouty subjects is apt to contain large sediments of uric acid especially during acute attacks whence is erroneously inferred increased excretion.

It should be mentioned that in a communication to the Tenth Congress of German Physicians so recent as 1892, Mordhorst, of Wiesbaden, also asserted that the average of the entire uric acid excretion of the gouty is considerably greater than in the rheumatic and healthy. These results are ascribed by Pfeiffer to the careless selection of material for the observation and defective method of analysis.

certain local symptoms. The latter are of an inflammatory nature and consist essentially in pain, swelling, and redness of the joints, preferably of the smaller ones, and especially of the metatarso phalangeal articulation of the great toe, more frequently, perhaps, of the left great toe.

It may be worth while to dwell a moment on the relation of the uric acid compounds to the local inflammations. It is scarcely necessary to say that uric acid does not exist as such in the blood, even in pathological conditions. The normal urates originally shown by Bence Jones, and recently confirmed by Sir William Roberts, are quadri-urates. In the pathological state these are converted into the less soluble bi-urates, which make up the blood deposits. It has all along been considered that these deposits are the direct cause of the gouty inflammation. Haig, as the result of his recent researches, reasserts this view in the following graphic language. *

> Then I also noticed that in curing a headache by giving an acid to diminish the excretion of uric acid, I always produced a certain amount of pricking and shooting pain in my joints (generally in those which had been most used on the day in question) and it naturally occurred to me that the uric acid was held back in these joints and produced the pains. The uric acid which had failed to appear in the urine must have gone somewhere. What more natural than to suppose that it had been retained in the joints (where in gout it is found) and that the pricking pains were the evidence of its presence?
>
> Then, on turning to Sir A. Garrod, I find that he had described precisely similar joint pains as occurring in gouty subjects immediately after the ingestion of beer or wine, and a very little investigation sufficed to prove that all wines and beers are strongly acid, so that a very simple explanation could be given of the facts.

In striking contrast to these heretofore-acknowledged views are those recently announced by Pfeiffer based on experiment and confirmed, he believes, by clinical facts. He introduced under the skin chemically pure crystallized uric acid suspended in water, with absolutely no immediate result. In the course of twelve to eighteen hours, as the uric acid began to be dissolved, irritation and skin inflammation presented themselves. These symptoms were further totally prevented if large doses of mineral acids were introduced into the body, by which solution of the uric acid was prevented, while the use of alkalies caused them to set in earlier and with greater intensity. So, also, the phenomena of irritation presented themselves earlier if the injection of uric acid was immediately followed by the introduction of alkaline solutions in the same locality, pain and inflammation present themselves promptly if solutions of uric acid are injected. The results of these experiments are also in accord, says Pfeiffer, with the clinical fact that the tophi of gouty patients are usually painless; often, indeed, they form without the knowledge of the patient. Not the precipitated uric acid, therefore, but the dissolved uric acid according to this view must be regarded as the irritating agent. According to it an acute attack is the result of a resolution by the blood of previously deposited uric acid, the impulse to this resolution being an increased alkalescence of the blood and body juices, the deposit being the result of diminished alkalescence.

Pfeiffer, in further support of this view, calls attention to the fact that the most recent chemical analyses by Lecorche, Ebstein, and himself show that the excretion of uric acid during an attack of gout is increased, and not diminished as taught by Garrod. I can, of course, have nothing to say of Pfeiffer's experiments, but so far as the clinical facts which he adduces to prove his position are concerned, my own experience is not in accord with his. The most recent studies on this subject, those of Sir William Roberts, embodied in the Croonian lectures and just republished in a small brochure entitled, "Uric Acid Gravel and Gout" support the older view that the "mechanical theory offers a natural and complete explanation." The crystalline urates precipitated in the cartilaginous and fibrous structures of the joints necessarily act as foreign bodies: they excite irritation, clog the lymph channels, exercise pressure on the tissue.

* *Op. cit.*, p. 2.

We are now ready for a rational treatment of gout. Whether it be an irritant in solution or an irritating precipitate, uric acid is its cause. Hence, whatever diminishes the amount of uric acid in the economy must tend to relieve gout. It is plain also that we may diminish uric acid in two ways, first by confining the gouty person to such food as produces a minimum of uric acid; second by administering such medicines as will promote its solution and elimination. The first of these constitutes in the main the dietetic treatment, the second the medicinal.

I. The dietetic treatment.—I have said the elimination of urea and uric-acid producing substances from the dietary constitutes the dietetic treatment, which is by far the most efficient of the treatments of gout, without which all else is only palliation.

This consists essentially in the elimination from the food of all nitrogenous or albuminous principles, whose complete combustion results in urea and incomplete combustion in uric acid. As to these there should be no half course. They ought to be excluded as far as possible from the dietary. I say as far as possible, for it is practically impossible to eliminate them altogether. The foods which are the type of this class should, however, be altogether omitted. Such are the meats of the butcher shops, the albumen of eggs, and the cheeses. The first include beef, veal, mutton, lamb, and pork, whether salt or fresh, and for the most part fish. As to cheeses, as one-half pound of cheese contains almost as much nitrogenous matter as a pound of meat, 27 per cent when made of the whole milk, and 28 per cent when made of skim milk, it is evident that they are contraindicated. If we consider only the edible parts of beef, i. e., meat deprived of the refuse represented by bones, skin, and shells, it contains, according to its source, 17 to 23 per cent of proteids; mutton from 15 to 18 per cent. Of fish, flounder contains 13·8 per cent, mackerel 18, halibut 15, and salmon 21 per cent, or quite as much as beef and more than mutton; salt codfish contains 15 per cent, smoked herring 20, and canned sardines 24. Poultry contains 14 to 15 per cent of albuminates and game 22 per cent. The hen's egg, including albumen and fat, contains 13·7 per cent protein, whence it is plain that the yellow of eggs contains a very small quantity and becomes a suitable food.

On the other hand milk contains but 3 to 4 per cent protein, butter 1 per cent, and oleomargarine 0·6 per cent. The fat oyster contains 8 per cent and the lean 4·2 per cent and the lobster 5·5 per cent. Other fish than the above mentioned 5 to 10 per cent.

Of vegetable foods wheat bread contains 8·9 per cent protein, wheat flour 11, and graham flour 11·7; rye bread 6·7, buckwheat flour the same, corn (maize) 9, rice 7·4, sugar 0·3, potatoes 2, sweet potatoes 1·5, turnips and carrots 1, cabbage 1·9, melons 1, apples and pears 0·4 and bananas 2 per cent. Again, beans contain 23·2 per cent and oat meal 12 to 15 per cent, large proportions of proteins.

Thus the typical foods permissible from the standpoint of composition are milk, butter, the succulent vegetables, except beans and oatmeal, and fruits. To these oysters and lobster may be added moderately, fish except those named as containing a large amount of protein, and where extreme rigidity is not required poultry in moderate amount; but all butcher's meat should be strictly forbidden.

It is usual also to interdict the use of carbohydrates, i. e., starches and sugars, as well as the hydrocarbons or fats, but I have never been able to see any reason for this. There is absolutely none from the standpoint of chemical composition, since they are totally without nitrogen, and, so far as my own experience goes, none from the clinical standpoint. Only in the event they produce indigestion and fermentation, with the generation of acids, can they become a cause of gout, and then only, I should say, exciting cause. I am in the habit, therefore, of permitting the use of rice, potatoes, and other farinacea, and, to a reasonable extent, sugar.

I am glad to be able to say that I am sustained in this view by Sir William Roberts, who, in the brochure just quoted, says also—

The most trustworthy experiments indicate that fat, starch, and sugar have not

the least direct influence on the production of uric acid; but as the free consumption of these articles naturally operates to restrict the intake of nitrogenous food, their use has, indirectly, the effect of diminishing the average production of uric acid.

Basing his conclusions upon experiments with solutions of blood serum impregnated with common salt (0·1 per cent) in which he found the precipitation of crystalline biurate always appreciably hastened, Sir William Roberts for some years past has directed gouty patients to restrict as far as possible the use of common salt with meals.

There is, however, another sort of ingesta, also entirely or almost free from nitrogen acknowledged to be both a predisposing and exciting cause of gout, and that is malt liquors and wines. These are composed of water, alcohol and other carbohydrates, and a trace of mineral matters, but no nitrogen. It is not easy at first thought to understand why these substances should be harmful. Experience, however, shows that the strongest wines, such as port, Madeira, and sherry, by their continued use, are very likely to produce gout; while the lighter wines, the clarets, hocks, and Moselle wines, if taken in moderation, rarely produce it. After these, stout, porter, and the strong ales induce gout. Even lager beer, which contains but 3 per cent of alcohol, is capable of acting similarly; and I know many men who have been forced to give up this beverage because of this effect. Cider and perry, also, predispose to gout to a less degree. On the other hand distilled spirits, especially whisky, are almost entirely without effect in producing gout. Why is this? Plainly, the amount of alcohol is not the measure of the effect, for whisky, gin, brandy, and rum all contain more alcohol than any of the wines alluded to. If reference is made to the wines most apt to produce gout it will be found that they are those which contain a considerable quantity of both sugar and alcohol. Such as port, sherry, and Madeira, all of which contain more than 15 per cent of alcohol and much sugar; also sweet champagnes, containing 11 per cent alcohol. On the other hand some very sweet wines, as Tokay, Malaga, and the higher sauternes, which contain much sugar, produce gout less rapidly. It would seem that those liquors which contain alcohol in combination with other substances, especially sugar, are potent gout producers, especially where they excite indigestion.

That the acidity of alcoholic drinks acts as an exciting cause can not be doubted. Whatever be the explanation few facts in the clinical history of gout are better established than that the ingestion of acid is an exciting cause.

In the same way act acid fruits, such as strawberries, acid oranges, and lemons. On the other hand, to such influence I have known the most divergent response. Thus, a gouty patient of my own could bring on an attack by drinking a single glass of lemonade, while a gouty friend would drink a pitcher of lemonade at dinner without any effect whatever. It is to be remembered that the otherwise harmful effects of the strong distilled spirits, such as are well born in gout, are no less serious in gouty subjects than in others, and are often induced by the careless prescription of whisky as less harmful than wines in gout.

II. The medicinal treatment of gout.—From the earliest history of the disease practice has recognized two classes of remedies in the treatment of gout, alkalies and purgatives, the object of both being to eliminate the offender, the first by producing soluble combinations which pass off by the kidneys, the second by the bowels. It is plain that a combination of the two principles might be expected to be more efficient than either one alone.

First, as to alkalis and alkaline combinations. My experience places the salicylate of sodium easily at the top, and while it is not so rapid in its effect in relieving the pain of an acute attack of gout as it is in rheumatism, it is nevertheless an invaluable remedy, excelling all others. During an attack it should be given in doses as large as can be borne. As a rule adult men easily bear 15 grains four times a day, or 10 grains may be administered every two hours. Even larger doses may be given

with advantage if borne by the stomach.* With relief to the acute symptoms the dose should be reduced, but, as in rheumatism, the remedy should not be discontinued, and between attacks smaller doses should be kept up for some time. These, however, may be substituted by the natural mineral waters to be presently alluded to.

After the salicylates the alkaline carbonates have always held a high position in the treatment of gout. Half an ounce a day should be the initial dose reduced when the acute symptoms are relieved, but continued in smaller doses. It may be combined with a little lemon juice to improve the flavor, or the citrate of potassium may be given in the same doses.

The lithium compounds, the carbonate and citrate, have not proven so useful as to cause me to prefer them to salicylic acid. Indeed the early result of Garrod with them can not be said to have been realized in modern therapeutics. Sir Dyce Duckworth says of lithia that it is a remedy better adapted to the chronic than the acute phases of gout. Five grains four times a day, freely diluted, is the dose usually administered, and with this the potash salts are sometimes combined.

A most valuable adjuvant to the medicinal treatment are mineral waters. The waters which have heretofore received almost universal approval are the alkaline waters, although those possessing purgative properties also possess much reputation. In America, however, so few of these waters are native, while those which are, are so far inferior to the foreign waters that it is practically impossible to fulfill these requirements by them alone; while the costliness of the foreign waters imported to this country is a very serious obstacle to their use.

The native waters commonly employed and which are highly vaunted by their owners on apparently insufficient grounds, are of the kind known as negative waters; that is, they have no mineral ingredient in a quantity to justify their classification in any of the four principal varieties of mineral waters, viz, the alkaline, the saline, the purgative, or sulphurous. Any therapeutic power they possess must be ascribed to their diluent effect. At the same time it has been noted that these waters are not without effect in relieving gouty symptoms. Reasoning from these facts I have long been in the habit of prescribing native drinking waters, such as are accessible to the patient, or distilled water may be used with this end in view, the simple diluent and solvent effect which comes from an increased proportion of water in the blood. The further propriety of such a course is found in the fact that gouty and lithæmic patients are often small drinkers, never drinking water between meals and very little at meals. To such, 8 ounces of water ordered on rising, between meals, and at bed time will often clear up a dark-hued urine of high specific gravity and substitute a light-hued, clear urine without any sediment.

The positive mineral waters that have acquired the greatest reputation in the treatment of gout are those of which sodium bicarbonate is the chief ingredient, to which the calcium bicarbonate is a valuable adjuvant. Such are the alkaline waters of Vichy, Evian-les-Bains in Switzerland, Neuenahr, and Fachinglen in Prussia, Contrexéville, and Vittel in the Vosges, and Dax in France.

Other waters possessed of reputation in the treatment of gout, in which the quantity of alkaline bicarbonate is smaller, owe this reputation to their combined alkaline and aperient properties, chiefly due to sodium sulphate and magnesium sulphate, and belong to the second category of remedies for gout. Such are the alkaline waters of Carlsbad and Marienbad in Bohemia, Kronthal in Nassau, and Brides-

*In this connection I desire to call attention to a method of administration of sodium salicylate by the rectum, the source of which I can not now recall: (1) The rectum is cleaned out of fæcal masses, preferably by warm water, and some time allowed to elapse after this before the drug is injected. (2) From 90 to 120 grains of salicylate of sodium are dissolved in 3 fluid ounces of warm water, to which 25 minims of tincture of opium have been added. (3) A 3-ounce syringe, with a long, soft gum tube attached to the nozzle, is filled with the solution, the gum tube introduced about 8 inches into the bowel, and the injection made once daily. (4) After the injection the syringe is withdrawn from the gum tube, which is allowed to remain in the bowel, the syringe filled with air, and this forced into the tube in order to retain the enema. The precaution must be taken of informing less intelligent persons that the injection is to be retained.

les-Salins in Savoy. Then there are the saline waters represented by Baden-Baden, Ems, Hamburg, Kissingen, and Ischl, Wiesbaden, and our own Saratoga waters, and those of Bedford, Pa.

Finally, there are the bitter acidulated and purgative waters Hunyadi Janos and Friedrichshalle in Hungary, Pülna in Bohemia, and Rubinat in Spain, rarely resorted to for gout, but useful as eliminating agents.

The use of these mineral waters is especially indicated in a continuous manner between attacks with a view to averting them. Especially useful are the thermal waters in the chronic arthritic complications in which their internal use is combined with bathing. In this connection may be mentioned Carlsbad and Marienbad, where also the mud baths are employed, Baden-Baden, Ems, Wiesbaden, Hammon R'Irha in Algeria, available in winter, Plombières in the Vosges, and Dax in France. Homburg, Kissingen, and Ischl are also resorted to for their baths, although the waters are cold.

Sulphurous waters also have some reputation in gout. Especially is this the case with the waters of Aix-la-Chapelle in Rhenish Prussia, and Aix-les-Bains in Savoy, Harrowgate in England, and Richfield Springs, Sharon, and St. Catherine's in America. In all these places the bath treatment is an important adjuvant.

The second category of remedies, the aperients, are decidedly useful in gout, both as eliminators and to prepare the way for the absorption and prompt action of the alkaline bicarbonates. They are not, however, used at the present day as freely as a century ago and they are commonly reserved for the acute attack.

Among the eliminating remedies is the time-honored colchicum, a remedy which is of undoubted value in gout, but which in my experience in most cases must yield the palm to salicylic acid. For a long time its action was inexplicable, and it came to be spoken of as a specific in gout, as quinine in chills, and mercury in syphilis. Modern studies have, however, solved this problem. Prof. Rutherford has shown that it is one of the most powerful cholagogues known. This, taken in connection with what we now know of the office of the liver in urea formation, simplifies very much the solution of the problem. This explains, too, why colchicum produces its sedative and anæsthetic effect without necessarily producing purgation. Indeed, some (as Sir A. B. Garrod) consider that its effects are best attained without purgation, and Garrod says that if cathartic action is required it is better to combine some aperient with the colchicum, as when much purging and vomiting result from colchicum, nervous and vascular depression follow. I confess I like to secure a little action on the bowels by increasing the dose gradually, and it is not necessary to produce either violent purging or vomiting. The preparation commonly used is the wine. In this country the wine of the seeds is no longer officinal, so that if the wine is ordered that of the root is dispensed. This is more powerful than the wine of the seeds. The dose of the latter is from half a drachm to a drachm or a drachm and a half during the attack, but of the root 15 to 30 minims, reducing the quantity when nausea or purgation ensues.

The acetic extract of colchicum was a favorite preparation of the older physicians, especially Scudamore, who introduced it and who considered its action milder than any other form. It is still sometimes used and has the advantage that it may be put into pill form. Its dose is 1 to 2 grains.

I am not in the habit of using colchicum in the interval between attacks of gout, and indeed use it less in the acute attacks since the salicylates have come into use, but still value it highly. Colchicum has also been regarded as a diuretic, but later observations go to show that it does not increase the elimination of uric acid or urea. It should not be omitted that some of the physicians of the third quarter of this century who had large experience with colchicum thought it caused gouty attacks, but Garrod and Sir Thomas Watson, whose combined experience is probably greater than that of any other two men, both deny it. It may be worth while to add here what the latter says of its efficiency: "This drug has certainly the property of easing in an almost magical manner the pain of gout." "How it operates," he

says, "is not so clear." We have seen that at the present day, however, a rational explanation is not wanting.*

The aperients commonly used in gout are the salines, of which the magnesium sulphate is the favorite. Sodium sulphate is also used, and it is the constituent of the most actively purgative mineral waters, the Hunyadi, Janos, and Friedrichshalle, already mentioned, which are now largely used instead. A favorite combination of the older physicians was magesium sulphate two drachms, magnesium carbonate a scruple, suspended in an ounce of cinnamon water, two or three times a day until active purgation results. These two substances may be combined with colchicum, and with it form a popular gout medicine.

Colocynth is also employed as an aperient in gout, and advantage has been taken of this fact in the preparation of the secret remedy known as Lavelle's tincture, which is very largely used by the laity and which undoubtedly has a very prompt effect in many cases of acute gout.

The following has been published† as the composition of Lavelle's remedy, the result of analysis: Quinine, 5 parts; cinchona, 5 parts; colocynthin, 2·5 parts; lime salts, 5 parts; water, 85 parts; alcohol, 100 parts; port wine, 800 parts.

Doubtless it will be expected of me to make some allusion to a remedy which has recently been introduced as efficient in the treatment of gout. I allude to piperazin. I regret to say that I have been disappointed in it. In my early trials I thought it useful, but soon learned that it was less efficient than the salicylates and colchicum. An acknowledged solvent for uric acid when dissolved in water, its failure as a uric acid solvent in the system is well explained by some recent experiments by Dr. Martin Mendelsohn, who placed small uric acid gravel in a 1 per cent aqueous solution of piperazin, in urine containing 1 per cent of piperazin, and in urine derived from a person during the administration of piperazin. The first solution produced a decided effect upon the stone, reducing its bulk one-half and liberating parts of the organic framework, but the stone in the second and third solutions remained uninfluenced. Mendelsohn further placed on a filter a known quantity of uric acid and passed over it the urine of a person who had taken two grams of piperazin in the course of a day, and found that at the end of this time the uric acid weighed more than it did before the urine passed over it, so that instead of the uric acid being dissolved away something more was added to it.

It will be remembered, too, that Pfeiffer has shown that it is one of the peculiarities of the gouty diathesis that the urine possesses a marked "precipitability" for uric acid; that is, it parts with its uric acid with great readiness, and it possesses, further, a disposition to give off uric acid to the uric acid filter above described in an especially high degree, and that under the use of certain mineral waters as those of Vals or Fachingen the urine loses this property. Now, if piperazin is an efficient agent to the end claimed it ought to produce the same effect on the urine as the mineral waters referred to did. In very carefully conducted experiments, however, Mendelsohn showed that this was not the case; so that it is true of piperazin, as of other substances, that while in aqueous solution it dissolves uric acid there is something in urine which interferes with this solvent power. For the relief of the acute attack of gout, leeches, blisters, and cold have all been discontinued of late years, not only because they are useless, but also because their use has been followed by fatal attacks of the so-called internal gout.

Warmth and moisture do, however, have a mollifying effect, which is increased if the liquid preparations of opium be associated with such applications. Cocaine, which might be expected to be useful, operates only through open surfaces.

All pressure by boots on joints disposed to gout should be carefully avoided as well as injuries, as such influences undoubtedly act as predisposing causes.

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* Colchicine, the active principle of colchicum, is also employed. Its dose is the one fiftieth grain. The same dose may be employed hypodermically. The fluid extract may be administered in doses of 2 to 6 minims.

† Druggist's Circular, October, 1889.

YELLOW FEVER: PATHOLOGY AND TREATMENT.

By F. PEYRE PORCHER, M. D., LL. D., Charleston, S. C.

I wish, in this paper based on the study of several epidemics of yellow fever in Charleston, to make three points which are of the first importance; also to give some of the results of my experience as regards treatment and pathology, which I do not think have attracted the attention they deserve:

First. That this fever in Charleston has always been accompanied by what is known as "breakbone fever;" this, though extremely mild, is not distinguishable, but being counted in with cases of true yellow fever prevents all accuracy in the mortality reports.

Second. That yellow fever is fully susceptible of successful management in fair cases, seen early.

Third. That life is compromised in the first six to ten hours of the disease; so that it is essential that treatment should be begun early.

Coexistence of yellow and breakbone fever.—Invariably two forms of fever existed together, namely, yellow fever, and a milder and more ephemeral, intercurrent species known and designated as "breakbone." Yet this was not by any means always ephemeral, for it often had a duration of several days. Whether they constituted two distinct species, or were only varieties of one and the same malady, has, strange to say, never been decided—no distinct lines of demarcation between the two have ever been satisfactorily established—no physician, however acute, having clearly pointed out any precise diagnostic difference. Though many cried "eureka," upon more rigid scrutiny the hopes they offered of a solution of the difficulty proved fallacious.

Among the observers there were to be found the lax and the strict constructionists, so that the usual confusion prevailed: *quot homines tot sententiæ*—there were as many opinions as there were persons to utter them. The question was, it must be confessed, surrounded by many difficulties, for whilst some forms of fever were very mild, and some characterized by black vomit and suppression of urine were very fatal, others presented every intervening shade of difference between the two; and though the access of what proved to be the simplest cases was sometimes severe and violent, the intensity of the disease was dependent for the most part, I think, upon the amount of climatization enjoyed by the party suffering; and its gravity and its termination, whether favorable or unfavorable, would be modified, it seemed to me, by neglect, by delay, or methods of management injurious or beneficial in their effects.

Individually, I am of the opinion that many who, by careful and assiduous attention on the part of the attendants were rescued from falling into a dangerous condition, and who recovered—the result would have been quite the opposite had they been managed otherwise. So that it was the early treatment and the appliances, and the eternal vigilance which sufficed to change the issue, and which did change it; and I hold that such cases, so metamorphosed by the simple, but important difference of management, would have had a very different termination; and would then, even by the most skeptical, have been placed in the category of true yellow fever, which was denied them if they did not get almost or quite into the third stage. The mild cases (breakbone, so called) may get well with little or no interference. The difficulty was that they could not be surely distinguished at their early inception; and the stranger, in my experience, sometimes had attacks, which, when vigorously managed at the beginning, were fully as innocent as those from which natives suffered, and which in these received the designation of breakbone. But in a fever like this, which does its work so rapidly, it was at least plausible to believe and to argue that neglect, delay, the avoidance of the proper means and appliances for reducing temperature, etc., would have very much to do with modifying the nature,

history, and ending of each case. This need not excite surprise, for did we treat scarlet fever or even measles with agents as active as those we were in the habit of administering in yellow fever, they would inevitably be made quite as fatal.

Pathology.—The peculiar poison when first introduced in the system produces (through nervous paralysis of the capillary arteries, perhaps) intense fever and great excitement of the circulation, with torpor of the glandular and secretory apparatus. It shuts up all the secretions and excretions, and with a high fever which it creates, rapid destructive metamophosis of the tissue occur, caused by the intense combustion going on; so that spoliative treatment, in the shape of mercurial, saline, or other purgatives, is imperatively demanded at this inceptive stage. These are to be accompanied by revulsives, hot foot baths, and the application of cold to the upper extremities, in order, severally, to empty the intestinal canal and the torpid glandular organs, to diminish temperature, and to contract capillaries. All these means, also, serve incidentally, but powerfully, to lessen the tendency to nausea, and to irritability of the stomach. The latter does not decidedly lead to, or induce black vomit, as is commonly supposed, though the one often accompanies or precedes the other. Both result from the same efficient cause, namely, the altered condition of the blood, induced by the fever. The peculiar vomit is probably owing to what Warren calls "mortified blood," blood thinned by the decomposing action of excessive fever (a quality peculiar to the yellow fever poison alone) transuding into the stomach and blackened by its acids. I could discover by the microscope,* frequently used, no distinct difference between this and other bloody matters vomited, which have been acted upon by the gastric juice, as where blood from a cancer is poured into the stomach and afterwards ejected.

The temperature in this peculiar fever, if unsubdued, leads infallibly and of necessity to subsequent trouble, to destructive tissue changes, to blood poisoning, to black vomit, to albuminuria, to coma, or to convulsions. I have seen thorough and persistent sponging with ice-cold water, when combined with the use of the other agencies advised, reduce the temperature, lessen all the bad symptoms in a surprisingly short time; having the power seemingly to change the entire character of the disease and imparting comparative mildness to its whole subsequent career. I will stand to this truth, for in the perception and practical carrying out of it lies the whole virtue of the plan which I advocate and assert to be successful.

In general terms, then, our first efforts must be directed to the relief of the intestinal and glandular torpor which always exist and which is marked by costiveness; we must diminish the cutaneous and general heat, empty the vessels of the system which are laden with impure blood, and obviate the tendency to renal engorgement indicated by the frequent presence of albumen. This is effected by the revulsives, aided by a mild alkaline diuretic, to be referred to subsequently. Then we must strive cautiously at construction, and whilst allowing the recuperative powers full exercise, we are to do nothing to impair the strength remaining, or weaken the energies of the constitution which have become greatly enfeebled. The unacclimated who are seized with the fever are nearly or quite always in a quasi-critical state, ready at any moment to take the descending path and to become dangerously ill; hence they require as careful handling as children do with scarlet fever. Whilst, therefore, nothing is omitted which will tend to diminish the fever, their strength must be carefully husbanded, for the slightest neglect, the failure to keep down the temperature by the application of cold water, or too much medication, though these may seem light transgressions, are powerful and weighty in turning the balance.

Mercurial and antiphlogistic purgatives, used at the beginning, serve to diminish the heart's action, to lessen the inflammation by spoliation, by the drain of fluids from the body, augmented by the cooling operation of the salines. All of these are measures only to be employed at the beginning, using the agents in sufficient amounts

*Illustrations of Disease with the Microscope. Prize Essay. Charleston, C. S. A., 1861.

to effect our object, which is to empty the bowels once thoroughly and effectually, without, as I urged, weakening the patient any more than is absolutely required. Purgatives are on no account to be persevered in. The failure to discontinue them after the efficient action of those used on the first day is procured, is, I am sure, a grievous error.

Several authorities commit the fatal mistake of repeating the mercury and cathartics and pushing their use much too far. Even Blair, though in my judgment eminently on the right track, and for this reason very successful, permitted his xx of calomel and xxiv of quinine to be repeated under emergencies, and be used again and again as often as six times; I prescribe it invariably, but never more than once, unless it is not retained or does not act.

In a fever like this, of one paroxysm (but with a remission somewhere between the twelfth and thirty-sixth hour, occurring more distinctly when the proper means are used early), which is exceedingly violent at the beginning, if unchecked, it does all the violence it is capable of in a very brief period.

I have been the first, I believe, to make a most important declaration: that life is virtually compromised in the first fifteen hours of its career. In such a fever, where the danger and the terrible sequelæ are owing entirely to the extreme intensity of the cremacausis, and the injury worked in the system by the high combustion which acts principally upon the blood, a certain treatment flows logically. There is no time to be lost in setting about it, and it is only to be regretted that our measures can not anticipate the invasion of the attack.

I sincerely believe that thousands of lives could have been, and can be, saved by a system of management begun at the very commencement of an attack of the disease, before the fever has had time to produce its direful effects, and by methods simple in their operation, perfectly compatible with reason and common sense, and also based upon a view of the pathology and progress of the disease.

That, consequently, where the demand for medical aid is so urgent, when physicians can not see their cases early—such precious time being lost by their enforced absence—an exception must be made to our usual procedure, and the people in such need must be told what to do before the physician arrives. This is required by the fact, which should be recognized by every one, that death results from the insidious and peculiar fever of the first six to ten hours—whenever this is permitted to go on unchecked—through failure to use these means which are perfectly adequate to restrain and keep down the temperature. So that when a man has been ill for twenty-four hours or forty-eight hours with yellow fever, the attendant is not responsible, and treatment which would have been efficient used early is not to be condemned because it fails at the stage where irremediable organic changes have taken place; and the practitioner who boasts that he has 50 or 60 patients on his list does not know that the last installment (those he can not see for ten to fifteen hours) are, in many instances, already irretrievably doomed.

In fair cases and temperate individuals, treated early, there is no need for any violent third stage, for any black vomit, albuminuria, suppression of the urine, etc.

It is a mistake to suppose that yellow fever is necessarily a fatal malady, that epidemics vary greatly in malignity, and that we must fold our hands supinely. The truth is that physicians in this city and elsewhere report at the end of the season very few deaths. Belot, of Havana, claims that 95 out of 100 fair cases seen early may be cured, and I agree fully with him. I have practised with success the method to be related in detail (see also Charleston Medical Journal and Review, since 1858, and president's address before State Medical Association of South Carolina, 1872). Dr. C. W. Horsey adopted the same treatment in the fever of Fernandina, Fla., 1878, others have employed it successfully, and Surgeon Sternberg refers to it approvingly in his elaborate and able article in Wood's Hand Book of the Medical Sciences. I had long shown that by the adoption of Blair's system, materially modified, the application also of cold water was the foundation fact in

the treatment. In confirmation of this, Prof. T. O. Summers, of Nashville, says, "Cold water is the remedy in yellow fever" (paper on treatment of yellow fever in 1879).

Treatment.—The treatment consists first in sponging assiduously the head, hands, and arms with ice-cold water at the very commencement of the attack, not losing an hour, and repeating this at intervals whenever the temperature rises, ice water being quite capable of reducing the temperature. Towels soaked in the ice water are preferable to sponging; fifteen to twenty minutes generally suffice for each application, its necessity being determined by the existence of pyrexia. Few perform this simple but essential procedure as efficiently as they should do. Secondly, give immediately Blair's "Calomel, grs. xx; quinine, grs. xxv" (in proportion to ages), and but once. I have never seen the quinine produce a single ill effect, though given when the fever is intense. Thirdly, follow in three or four hours with a saline cathartic (sulphate of magnesia), which is cooling and antiphlogistic. Fourth, apply mustard plasters to the entire abdomen, and use hot mustard pediluvia from the beginning of the attack, and repeat them frequently. These may be followed by a cantharides plaster upon the abdomen—which certainly does no injury. After the saline has acted, give an effervescent or antacid mixture of this nature (which also had the support of the late Prof. E. Geddings). Potas. acetate, 1 dram ad 2 drams; potas. citrate, 1 dram; morphia, 1 grain; water, 6 ounces. A dessert spoonful every two or three hours. Used to quiet gastric irritation and to act slightly as a mild antacid and diuretic.

No other treatment or active medication are required save the continuance of the cold application and pellets of ice given internally if necessary. Doubtless a few drops of tincture of aconite added to the mixture, or given separately, might prove serviceable.

By this method those recover, according to my experience, carefully recorded, who are seen early; who possess their organs in a state of integrity; with the intestinal canal, liver, kidneys, and other emunctories in a fair condition. This surely is not asking too much; and to claim that recovery will almost invariably ensue in such cases, under the plans detailed elsewhere, and on this occasion, is, if I am correct, making what I can not regard but as a true and important advance. This I hope and believe will one day be fully acknowledged. It is spoken seriously and earnestly without lightly coming to the conclusions, and I sincerely trust that the expression of them will not be regarded as presumptuous or premature.

How different is this from a former system of mercurial purgatives repeated every five or six hours, or a constant effort to induce ptyalism by giving mercury with opium at any and every stage of the disease—with the omission of other measures insisted on here as of the first importance. Persons seized with such a fever, who are not seen for ten or twenty hours, those who already suffer from organic lesions, whether of the stomach, liver, or kidneys, whose digestive organs (so essential to the nutrition, growth, and repair of the system) are irritated and inflamed by the use of intoxicating drinks, can not be expected to respond to any treatment, however judicious and appropriate.* In such subjects there is great tendency to irritability of stomach; the purgatives are not retained, the inflammatory stage (fever) runs high, and can not be subdued. Congestion of the internal organs, kidneys, etc., with albuminuria, occurs; black vomit sets in; and uræmic poisoning, with coma, generally closes the scene—during attacks of violent convulsions. Under such conditions, all agents prove nugatory; every effort is necessarily unavailing; and these cases—falsely and illogically reasoned from—bring reproach upon true and legitimate treatment, which can be shown to be serviceable in those who, from the beginning, are not plainly beyond the reach of art.

In my humble judgment, if not the height of folly, it is at least extremely unfair, to decry, or, which is worse, to abandon, a course of management which is eminently

* "There is no hope for the drunkard."—S. H. Dickson.

and strikingly successful in nearly or quite all the cases of the class previously described, because it fails to cure those who have no right to expect a miracle to be worked in their behalf.

Any treatment which is successful is not so by accident, but because it is based upon the requirements and real nature of the disease and throughout does the patient no harm. It is high time for the intelligent members of our profession, particularly if they be at all apathetic, to give up the pleasing idea that the practice of physics is all guess work, in which one artist does full as well as another; that fate and the disease have the control, and that always when a child or man dies, the "physician who heals is death."

THE DIAGNOSTIC VALUE OF STETHOSCOPIC PERCUSSION.

By HENRY SEWALL, PH. D., M. D., of Denver, Colo.

That it is through the means of physical exploration that medical diagnosis most nearly approaches an exact science is a doctrine which should be fruitful in good results. When a method of physical examination for which masters in medicine have claimed unusual advantages has not come into general use, there must be some strong and pratical reason; and it will be the object of this paper to discover that reason and to urge the value in physical diagnosis of the application of stethoscopic, or, as it is more commonly termed, auscultatory percussion.

In 1840 Drs. G. P. Camman and Alonzo Clark published in the New York Journal of Medicine and Surgery an article entitled "A new mode of ascertaining the dimensions, form, and condition of internal organs by percussion." These authors recommended in carrying out their method a special form of stethoscope made of a single piece of wood, some 6 inches long and an inch in diameter, wedge-shaped at the end to be applied to the body, and broad at the other to fit the ear of the observer. Percussion was carried out by the use of a pleximeter, which was presumably manipulated by an assistant. No work which has been done on this subject bears the evidence of such exact and thoughtful observation as that of Camman and Clark, and their own words form an admirable description of the application and results of the method. They say:

The observer, suppose, practices first over the heart, listening and percussing on the same region. With each blow of percussion the ear receives a sudden, clear, intense sound of high tone, attended with a degree of impulse even painful, appearing to be immediately under the instrument or produced within it; of short duration and ending with some degree of abruptness. Now find the longest diameter of the heart in contact with the walls of the chest—it may be 3 inches—listen at one extremity and percuss at the other. The sound is the same in character and has lost little of its energy. Percuss at the point where the lung begins to overlay the heart; the sound is instantly modified and mixed, yet its cardiac type is still preserved. Recede still further with percussion, moving by short steps toward the body of the lungs. At a certain point the sound suddenly changes; it loses its intensity and high tone; it is no longer impulsive; it is grave and distant, much more distinctly heard by the open ear than by that applied to the instrument. Again, let the observer in like manner explore the hepatic region. Within short distances the sound is sudden, clear, intense, and immediately under the instrument as before; yet it is less intense, less acute, and more prolonged; it is even semireverberant. As he increases the distance between the points of auscultation and percussion, the sound diminishes more rapidly than over the heart, though it is not entirely lost till percussion passes off from the organ on to another medium. By this mode of exploration the heart and liver become distinguishable through a class of signs which, judging even from the analogous consistency of these organs, would not be supposed to exist.

In 1880 T. A. McBride described in the New York Archives of Medicine a form of binaural stethoscope, composed of solid wooden pieces, by which auscultatory percussion could be conveniently carried out by a single observer. These authors restricted themselves chiefly to the determination of the outlines of the heart and

liver. Various other observers, including Roussel, de Mussy,* Zuelzer,† and, according to Weil,‡ even Laennec and Piorry have called attention to the facility with which organs and morbid growths could be differentiated by the stethoscope applied to one side of the chest while percussion was carried out by an assistant on the opposite side. It is extraordinary, as is remarked by McBride, that in the recognized treatises on physical diagnosis the method of auscultatory percussion has received but little attention and no indorsement. Gerhardt§ appears to make no reference to it. Weil speaks slightingly of the method and declares that, as a rule, it offers no special advantages. Loomis‖ and Page¶ mention the procedure on the authority of Camman and Clark; but all these writers refer to the subject as if at second hand, as though they had failed to give it personal investigation. It is therefore not surprising that the active members of the medical profession are, for the most part, either wholly unfamiliar with the practical application of auscultatory percussion, or, in isolated instances, only use the method when some accident of experience has illustrated its value.

The reasons why physical examination by the method of stethoscopic or auscultatory percussion has not come into general use are not far to seek. In the first place, the mechanical impediments to pursuit of the practice have been made burdensome; special forms of stethoscopes, useful only in this particular kind of examination, have been recommended, and usually the services of a skilled assistant required to carry out the observations. In the second place, most descriptions of the findings of stethoscopic percussion enter so fully into the pitch and quality differences of sounds elicited by percussion of various organs, as would manifestly need for their appreciation such a musical cultivation and training in the physics of acoustics as might well discourage the student in medicine from attacking so cumbersome a method.

The writer of this paper has never employed the special instruments described by Camman and Clark or McBride, though it seems probable that the results so obtained must be particularly striking and accurate. But it is the particular design of this essay to show that auscultatory percussion may be advantageously and readily carried out by any single observer who uses a stethoscope; that it is the easiest of all methods of physical examination; that it allows the accurate outlining of organs and deposits impossible to delineate by ordinary means; and that, though capable of extensive development as a means of diagnosis under the acoustic skill of the observer, its limitations are so well marked as to instruct without confusing any ear that can hear.

My own work has been done with the simplest form of binaural stethoscope. The diameter of the bell for applying to the body is but five-eighths of an inch at its mouth, so that it can usually be inserted between the ribs of a patient. It should be remarked, however, contrary to McBride's statement, that by this method it makes little apparent difference whether the mouthpiece of the stethoscope overlaps the ribs or lies wholly between them. I was first impressed with the value of auscultatory percussion on attempting to outline the stomach in the case of an old man, the victim, apparently, of chronic peritonitis, whose intestines were inflated with gas. It was not possible by ordinary percussion to determine the lower border of the stomach. The stethoscope was applied over the upper left border of the epigastrium, and with the pulp of the middle finger of the right hand the abdominal wall was gently tapped, so gently that no sound was audible to the unaided ear, the finger being carried in a straight line from the stethoscope outwards. With each blow of the percussing finger a peculiar shock, with a certain loudness and quality of sound, was conveyd to the ear, gradually decreasing in intensity as the percussing finger receded from the stethoscope until a certain point was reached; then the loudness

* Quoted by McBride.
† Berlin. Klin. Wochschr., 1877.
‡ Topograph. Percussion.
§ Lehrb. d. Auscult. u. Percussion.
‖ Physical Diag.
¶ Phys. Diagnosis.

of the tone and the intensity of the shock suddenly diminished; at the same time the quality changed. But it is desired to especially observe that quality differences in sound are to be left to the unconscious appreciation of the examiner, and are not to be depended on in this description. Having marked the spot at which this change in sound occurred, the percussing finger was carried from the stethoscope as a center along other radii, and it was found that the line joining all the points so determined represented the shape of the greater curvature of the stomach. Whenever the outline of an organ was determined in this manner, the result was verified by placing the stethoscope outside its limits and percussing up to it. It frequently occurs that the boundary between two adjacent organs can be more readily determined when auscultation and percussion are performed on one than on the other.

In outlining an extensive body, as the stomach or the liver, it is frequently of advantage to shift the position of the stethoscope along the line of percussion. I have paid more attention to the determination of the outlines of the stomach than of any other organ, because the difficulties to be overcome are in this case, perhaps, on the whole the greatest. In six different autopsies the stomach was outlined in the manner described, the boundaries being marked by inserting pins into the abdominal wall perpendicular to the surface and their position among the viscera afterwards determined by section. In one of these cases the stomach was dilated, reaching far into the right hypochondrium, was wholly covered by an enlarged liver, and the abdominal cavity contained free gas. In another the stomach was contracted into the form of a tube, having a diameter of less than two inches. Nevertheless, the greater curvature of the organ was outlined in each case with almost perfect accuracy. The greatest error occurred in a case in which the border of the stomach lay just under the free margin of the ribs. One pin was found to have been inserted into the stomach three-fourths of an inch from its edge, and another one-half inch below it. It is worthy of remark that, though the stomach and colon are thus usually easily distinguishable, the stomach and duodenum do not appear to be, and my pins sometimes traced the course of the gut for a distance beyond the pylorus. Leichtenstern, quoted by Weil, used a somewhat similar mode of stethoscopic percussion to differentiate the stomach from colon, depending, however, on the pitch and quality of the notes elicited from the two organs. But it is worthy of being insisted on that though the pitch and quality of the percussion note vary with the organ struck, and are at least unconsciously appreciated by the examiner, the most important factors to be noticed when the percussing finger passes from one organ to another are the changes in loudness and shock of the note.

In those not infrequent instances in which the stomach gives to ordinary percussion a dull sound, stethoscopic percussion is at no loss to distinguish the true boundaries. In a recent clinical case in which this stomach dullness made it impossible to outline in the ordinary way the contiguous borders of liver, spleen, and lung, the difficulty disappeared at once under use of the stethoscope.

In another patient in whom the determination of the superficial area of the liver was of great importance, the liver dullness as made out by ordinary percussion extended over only one costal interspace; stethoscopic percussion, however, declared the liver to reach the margin of the ribs, giving the organ a normal volume. The next day, after free purgation, the normal limits of liver dullness were determinable by ordinary percussion. Probably few examiners are capable of outlining with certainty the border between the liver and a superincumbent pleural effusion; by stethoscopic percussion, however, the matter is easily accomplished. In an autopsy on a case of pyo-pneumo thorax it was found possible to define within one-fourth inch the boundaries of both relative and absolute liver dullness, as verified by aspiration of the fluid and by section. To fix the line of division between air and fluid involved, of course, no difficulty. The method offers valuable assistance in determining the level of effusions, pleuritic or abdominal. In the latter case spleen, liver,

and kidneys can easily be distinguished. The splenic borders are readily determined when obscured to ordinary percussion by contact with a distended stomach. The cranial sutures can usually be made out by stethoscopic percussion of a bald head or shaven scalp. I have watched in vain for an opportunity to outline, if possible, a superficial brain tumor.

The most interesting application I have found for this method was in a case of pneumonia in which an encysted empyema developed outside the left lower lobe of the lung. The pus touched the chest wall in contact with and parallel to the sixth and seventh ribs throughout their anterior and lateral portions. Neither by ordinary percussion nor by auscultation could the empyema be with certainty distinguished from the adjacent solid lung tissue; but by stethoscopic percussion the cyst was outlined, and my colleague at the county hospital, Dr. John Boice, resected a rib near the lowest point of the area so determined, and declared that no better place of incision could have been chosen. Had the chest been open in the ordinary region the cyst would have been missed altogether. In another case of a large empyema, encysted over the liver, stethoscopic percussion assisted the surgeon by exactly locating the top of the latter organ. The delicacy of this method is nowhere better illustrated than in examination of the normal lungs. When the stethoscope is placed over one lobe and the percussion finger made to travel across to another, there is a distinct change in the sound as the interlobular fissure is passed. Though but little attention has been paid to this part of the subject, I have on two occasions at autopsies inserted long needles with considerable accuracy into the line of the interlobular fissures as determined by auscultation percussion.

The limits of usefulness of the method of stethoscopic percussion as thus described are obvious. While a trained ear by the aid of special instruments, such as devised by Camman and Clark and McBride, could, no doubt, determine the physical condition of the organs investigated, as to their fluid, solid, or gaseous content, the present paper does not treat of this possibility. The sudden diminution in the shock and intensity of an auscultation-percussion note as the body surface is tapped by the finger moved along radii centering in the stethoscope, simply means that the percussion has reached an organ, growth, or effusion outside that over which the stethoscope is placed. This result is altogether to be expected, since vibrations set up in any homogeneous body must suffer great diminution in energy when transmitted to an adjoining body of whatever consistence. Stethoscopic percussion must be used in cojunction with ordinary percussion and with consideration of topographical anatomy. For example, the position of the border of the left lung upon the heart can usually be accurately determined; but whether this line does or does not mark the lower or upper margin of the heart, the sound elicited does not make clear.

In fact, twice, at autopsies, needles were inserted into the margin of the lungs covering the heart with the thought that the lower border of the latter organ had been outlined; further experience corrected such mistakes.

An advantage possessed by the method of stethoscopic percussion deserving of special mention, is the feeling of certainty with which its results usually impress the examiner. In post mortem observations I have been interested to note that when stethoscopic percussion had given distinct evidence of the outlines of organs, no mistake was ever made. On the other hand, whenever an error was committed, the examination itself had been dubious in its indication.

FORMAS DEL IMPALUDISMO I UN MEDIO DE RECONOCERLAS.

Por el DR. FRANCISCO A. RÍSQUEZ, de Venezuela.

En Venezuela el paludismo reviste formas tan variadas i anómalas, que ofrece grandes dificultades al práctico para reconocerlas.

El corto tiempo de que puedo disponer para esta comunicación no me permite describirlas detalladamente. Por tanto, he de limitarme á mencionarlas, señalar las dificultades del diagnóstico é indicar el medio fácil i seguro de que acostumbro valerme para descubrir la existencia del elemento palúdico, convencido de que el diagnóstico diferencial de ese Proteo de la patología intertropical es indispensable, so pena de esponer la vida de los enfermos, ya por falta de quinina, ya por la administración inoportuna de este agente.

Me atendré en esta somera descripción á las cuatro formas clásicas del paludismo, á saber: (I) Formas intermitentes; (II) Formas continuas; (III) Formas perniciosas; (IV) Formas larvadas.

I.

Las formas intermitentes son, en lo general, de tipo cuotidiano, á veces terciano, mui raras veces de otros tipos.

De ordinario pueden reconocerse por sus caracteres clásicos: un acceso brusco que comienza por escalofrío, en los adultos, ó por enfriamiento de los estremos, en los niños; seguido de elevación térmica notable, casi nunca ménos de 40° C., í que termina por un sudor que hace descender la cifra termométrica á ménos de 37° C.; un acceso semejante, con tendencia á repetirse con una periodicidad regular, modificable por la influencia del tratamiento, ó por la persistencia del elemento causal, será siempre de origen palúdico, pués los accesos piohémicos í los de origen tuberculoso, que se le parecen notablemente, pueden reconocerse por la presencia de focos supurados, ó tuberculosos.

Sinembargo, casos se presentan en que el diagnóstico se hace dudoso, ya porque el acceso se prolonga más de 24, 36, í aún 48 horas; ya por alguna anomalía en su evolución; ó bién por la coexistencia en la localidad de algunas otras afecciones febriles, endémicas, ó epidémicas. I necesitándose en todo caso sin tratamiento apropiado, se requiere, como circunstancia indispensable, un diagnóstico exacto í precoz.

II.

Las formas continuas afectan dos variedades: (*a*) la gastro-hepática; (*b*) la tifoidea.

La primera (*a*) da la fiebre biliosa simple, caracterizada por fiebre moderada, lengua saburosa, vómitos, sensibilidad epigástrica í á veces diarrea. En un grado mayor de la intoxicación sobreviene la ictericia, la albuminuria, las hemorragias gástricas, intestinales ó urinarias, los vómitos negros, la adinamia, constituyendo las modalidades de fiebre biliosa grave, fiebre ictero-hemorrágica, fiebre hematúrica.

En la biliosa simple, el diagnóstico, aún siendo dudoso, no es urgente, porque se trata de una afección que se cura pronta, fácil i aún espontáneamente.

Pero la biliosa grave se parece tanto á la fiebre amarilla, algunas veces reinante como endemia, ó epidemia, á la par del paludismo, que la duda subsiste aún después de observados varios casos.

Ahora bién; la necesidad de la distinción entre estas dos pirexias es tanto mayor cuanto que el tratamiento es enteramente distinto en una í otra, pués la quinina, que en la primera sería la tabla de salvación, en la segunda sería inutil, si nó perjudicial.

Ese diagnóstico diferencial ha sido fuente de largas discusiones, de las cuales todavía no se ha deducido un carácter discriminativo seguro; í fué justamente en vista de esa oscuridad, que me propuse buscar un medio fácil é inequívoco para

declarar la existencia, ó la ausencia del paludismo, en casos al parecer enteramente iguales.

La segunda variedad (*b*) constituye la tifoidea palúdica, ó tifo-malaria, pirexia híbrida que puede ocurrir, ya porque una paludosa desarrolle una apariencia sintomática que semeja el estado tifoideo (yo las llamaría pseudo-tifo-maláricas); ya porque en un impaludad se presenta el tifus abdominal; ya, en fin, porque el germen malárico se determina en el curso de una tifoidea. De todos modos, la semejanza entre la tifoidea pura í la tifo-malaria es tan estrecha, que la sola observación de los sintomas í marcha es insuficiente para la oportuna discriminación í la necesidad de establecerla de un modo cierto es tán urgente como en la primera de estas dos variedades de formas continuas.

III.

Las formas perniciosas propiamente dichas, llamando así aquellas en que el germen palúdico exagera uno de los estadios del acceso, ó provoca determinaciones sobre algún órgano ó aparato, que según las oscilaciones de la fiebre periódica, son por lo general fáciles de reconocer, sobre todo si han precedido algunos accesos intermitentes, simples ó perniciosos. Así, pueden presentarse sudores, algides, congestiones, hemorragias, estados comatosos, diarreicos, convulsivos, ó paralíticos, que desaparecen í reaparecen con el acceso febril, constituyendo otras tantas variedades de fiebres perniciosas.

Pero no siempre se podrá esperar tranquilamente la evolución de un accidente pernicioso, ó su repetición, para diagnosticarlo, sabido que toda fiebre perniciosa es grave í debe tratarse con el específico desde su aparición; de donde la urgencia de un diagnóstico seguro í precoz.

En la variedad de perniciosas á las cuales reservo yo el nombre de complicadas, í cuyo carácter estriba en una determinación sobre un órgano, bastante profunda para persistir en los intérvalas de apirexia, como si fuera una enfermedad aparte, el diagnóstico se hace más difícil. Pero es urgente precisarlo, á fin de dedicarse á combatir al mismo tiempo la afección principal, con el específico quinina, í la secundaria con el plan especialmente dirigido á ella. En esta variedad ocurre de ordinario que la complicación esconde el elemento causal, í descuidando el combatirlo, se dificulta í aún imposibilita la curación.

IV.

Las formas paludosas larvadas son de dos variedades:

(*a*) Unas veces están constituidas por un accidente, como una neuralgia, una congestión, una hemorragia, una parálisis, etc., que, acompañadas ó nó de elevación térmica, pueden reconocerse por la prontitud con que desaparecen í la periodicidad con que se renuevan. Sinembargo, en el primer acceso larvado, á veces en el segundo í hasta en el tercero, puede desconocerse su origen palúdico, í no siempre podrán repararse las consecuencias de semejante error.

(*b*) Otras veces, el accidente larvado es una enfermedad en cuya marcha ningún carácter revela su naturaleza paludosa, viéndose entonces resistir el mal al tratamiento, en tanto que no se reconoce la verdadera causa í se aplica el específico quinina.

De esta clase he visto colerinas, diarreas, disenterías, hematemesis, pulmonías, pleuresías, bronquitis, pseudo-tuberculosis, hemoptisis, meningitis, parálisis, convulsiones, í muchas otras manifestaciones mórbidas que, apareciendo como entidades protopáticas, no son sino accidentes palúdicas que no ceden sino á la quinina.

Algunos prácticos niegan la posibilidad de que el paludismo pueda originar ciertas afecciones, es decir, que haya, por ejemplo, disenterías, pulmonías, etc., palúdicas. Pero es un hecho de diaria observación que un impaludado presente, como única manifestación del infectivo, una disentería, una pulmonía, una orquitis, etc., í que es

inútil tratarlas por los medios ordinarios empleados contra ellas, pués no ceden sino al antimalárico. Como se explique el hecho, no es de este lugar; pero me atrevo á creer que las embolías pigmentarias í las aglomeraciones de parásitos en los vasos sanguíneos, que no se destruyen sino con la quinina, pueden esplicar perfectamente esas complicaciones.

Es en estas formas larvadas de la segunda variedad, principalmente, que el diagnóstico se hace á veces imposible, dando lugar á vacilaciones, í á que, ó se deje de administrar oportunamente el específico salvador, ó al revés, que tomando por palúdicas afecciones que no lo son, se agrave la enfermedad por la administración inoportuna de la quinina.

V.

Se ve, según lo dicho, que por los solos síntomas del paludismo, en las formas larvadas de la segunda variedad, lo mismo que en el primero í segundo accesos de la variedad precedente, el diagnóstico es casi siempre imposible; que en las perniciosas, sobre todo en las complicados, es por lo regular difícil; que en las continuas es aún dudoso en ocasiones, í en las intermitentes, á veces inseguro ó tardio. I sinembargo, repito: la exactitud de ese diagnóstico es necesaria, í hasta urgente en muchos casos: la quinina, como piedra de toque, es muchas veces útil, í aún he observado que desenmascara las formas larvadas, apareciendo bajo su influencia la fiebre al desaparecer el accidente larvado. Pero este es un medio de efecto tardio, í no siempre seguro, por lo cual se hace necesario un medio inequívoco í suficientemente sencillo para hacerlo práctico, í ese medio lo suministra el examen de la sangre.

El descubrimiento de Laverán ha dado á la ciencia una prueba cierta para reconocer la malaria; pero la investigación de los hematozoarios de Laverán, como el mismo lo reconoce, requiere un conocimiento de la técnica microscópica, una habilidad para la observación í un tiempo para los detalles de manipulación, que no están al alcance de todos los prácticos.

De esas dificultades ha nacido el medio que acostumbro í propongo, el cual no es nuevo en su fundamento, aunque si lo es en su aplicación á la clínica.

Sábese hoi que la intoxicación palúdica produce siempre la melanemia, í que esta es una manifestación esclusiva del paludismo; luego la presencia del pigmento negro en la sangre es un carácter patognomónico del impaludismo.

Si en un sugeto que se sospeche impaludado, se toma una gota de sangre, por la picadura de un dedo, í se estiende en capa delgada entre dos laminillas de vidrio, bastará un pequeño aumento de 300 á 500 diámetros, para encontrar en medio del plasma las masas negras irregulares de pigmento. Si alguna duda quedare respecto á la naturaleza de alguna masa negra que se hallase, bastaría agregar una gota de ácido sulfúrico concentrado que, destruyendo todos los glóbulos í las masas de hemoglobina, dejaría intacto el pigmento.

Como se ve, el procedimiento es sencillo: el práctico puede llevar en su bolsillo algunas láminas de vidrio, tomar la sangre á la cabecera del enfermo, como queda dicho, í guardarla para el examen, que no exige más de cinco minutos, ni grandes aumentos, ni los procedimientos delicados de coloración requeridos por todo examen bacteriológico. Es más fácil í breve que el examen clínico de una orina.

Las observaciones hechas en los enfermos de la práctica civil í en los del Hospital Militar de Carácas, donde es ya un examen corriente entre los estudiantes, me han dado los siguientes resultados:

(1) En los accesos intermitentes, en las fiebres paludosas continuas, en los accidentes perniciosos, en las formas larvadas í en la caquexia palúdica, se encuentra siempre pigmento;

(2) La abundancia í magnitud de las masas melánicas guardan relación con el grado de la intoxicación palúdica;

(3) El pigmento disminuye en los intérvalos de los accesos; pero no desaparece sino cuando queda cortada la manifestación palúdica;

(4) En las demás afecciones no palúdicas no se encuentra pigmento; á menos que el individuo afectado de otra enfermedad sufra al mismo tiempo de paludismo.

De todos modos, la presencia de la melanemia indica siempre paludismo í reclama el empleo de la quinina, sea el paludismo la enfermedad única, ó sea concomitante de aquella.

A mi modo de ver, pues, en las localidades maláricas el médico debe estar provisto de vidrios porta-objetos, í siempre que sospeche intervención palúdica, debe examinar la sangre como el medio más sencillo, rápido í al alcance de todos para diagnosticar un accidente del paludismo í precisar con toda certidumbre la indicación del específico quinina.

La cuestión es de vida ó muerte en ciertas fiebres continuas, accidentes perniciosos í formas larvadas: sólo puede curarlas la quinina osadamente administrata; mientras que si se toma por manifestación paludosa lo que no es, la quinina administrada por simple sospecha puede causar la muerte del enfermo.

AN OUTBREAK OF TYPHOID FEVER PRESENTING UNUSUAL FEATURES.

By WM. C. DABNEY, M. D.,
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The atypical forms of typhoid fever during the past few years have received much attention, and doubt has frequently been expressed whether atypical cases should be considered typhoid at all. A singularly favorable opportunity for studying cases of this character was furnished by an outbreak at the University of Virginia in the winter and spring of the present year (1893), and I propose to give a brief account of the outbreak in this paper.

In order to understand the origin of these cases, it will be necessary to state briefly the arrangement of the lodging rooms and eating rooms at the institution.

The buildings of the university used as dormitories by the students are scattered over a space of 10 or 12 acres, and there are four hotels, or "mess halls," at which the students get their meals. A student can select his own boarding house, so that each hotel has "table boarders" from all parts of the university grounds.

At the time of the outbreak—on February 17—there were about 530 students at the university. Of this number, about 350 roomed in the university buildings and took their meals in the university hotels.

There had been no typhoid fever at the institution for many months, nor were there any cases in the vicinity except one, of which I shall speak later.

On the 19th of February I was consulted at my office by Mr. D. D. H., a law student, who complained of loss of appetite, debility, and headache. His temperature was between 101° and 102°. Influenza was prevailing at the time, and I thought it probable that he was suffering with an attack of that disease, but a few days later he sent for me, and I found him with a well-marked attack of typhoid fever, which pursued a mild but typical course and ended in recovery.

A few days later I saw Mr. K., an academic student, who had a severe headache, a temperature of 104°, aching in his limbs, and constipation. He had been sick only twenty-four hours. He was given salophen in six-grain doses every four hours, and the next day he went to his home in a neighboring city, where, as I was informed, he had a mild attack of typhoid fever.

These two young men lived in different parts of the university, but took their meals at the same boarding house and sat at adjacent tables.

Perhaps, before going further, I should mention that the water supply of the university is perfect in all respects, and the system of sewerage is excellent.

Just after the occurrence of the second suspicious case, I found that there was a negro man—a waiter—ill with typhoid fever in the basement of the hotel where

these young men got their meals. On further inquiry, I found he had been ill for about four weeks, and that another waiter, who lived outside of the university grounds, also had the disease. I did not see either of these cases, but was informed by the physician who attended them that they were typical cases of typhoid, one being quite severe in character.

Between this time and the 1st of April there were ten additional cases, making fourteen in all, and these patients lived in different parts of the university grounds, some being a quarter of a mile apart, but all took their meals at the same hotel.

Immediately after the occurrence of the second case and the discovery of the ill man in the basement of the boarding house, the dining room was closed and a thorough inspection of the building and premises was made by the health committee, consisting of three physicians and two engineers. Nothing was found about the house to account for the sickness, and an examination was then made of the milk supply. It was found that a part of the milk supply of this boarding house came from the dairy of the keeper of the house. An inspection showed that the dairy was situated some distance from the university and on the banks of a creek, into which one of the main university sewers opened and at a point above the dairy. It was further found, by questioning the milkman, that he got water from a point about 20 yards below the opening of the sewer, to wash the cows' udders before milking. Besides this, there had been a case of typhoid fever on this creek a mile above the dairy during the previous autumn, and the discharges from this patient—an ignorant negro—were thrown upon the ground without disinfection.

Before proceeding to consider the peculiar features of some of these cases, I wish to emphasize certain points that I have already mentioned:

(1) There had been no typhoid fever in or around the university for several months, so far as I could learn, except one case in the vicinity, from which infection was practically impossible.

(2) Between the middle of January and the 1st of April there occurred fourteen cases of continued fever among persons living or employed in the university grounds.

(3) The persons who had this continued fever had rooms in many cases widely separated from each other, but all took their meals at the same hotel.

(4) The water supply of this hotel was the same as that of the other hotels and of the other parts of the university, and the sanitary condition of the building was good.

(5) A part of the milk supply was obtained from cows whose udders had been washed with water contaminated by sewage and probably infected with typhoid-fever germs. It was in evidence also that at least five of the fourteen persons used milk at every meal. Probably there were others who did so, but I could only get definite information as to five.

Of the fourteen cases of this continued fever ten were under my professional care and four under the care of other physicians, though I saw one of these four cases at the commencement of the attack and another near convalescence; several of my cases were seen also by my colleagues, Drs. Towles and Barringer, of the University of Virginia. Of the fourteen cases one was in a child 12 years old, the daughter of the hotel keeper; the others were in young men between the ages of 18 and 25 years.

Of the ten cases under my immediate care there were but three that pursued anything like the typical typhoid-fever course. The first patient, Mr. D. D. H., was taken sick on February 17, and his evening temperature was normal for the first time on March 5. His temperature during this time ranged between 101° and 103°. The eruption in this case was well marked. The bowels usually moved spontaneously, but there was at no time any diarrhea. The only complication was an inability to pass urine, which for a week necessitated the use of the catheter.

Mr. G. was taken sick on March 4 with nausea and vomiting. His temperature ranged from 101° to 105° till March 25, when he had a profuse hemorrhage from the bowels, with extreme prostration; the hemorrhages recurred at intervals until the 30th; there were no more hemorrhages after that time, but the stools were liquid, very

offensive, and passed involuntarily. On April 5 the morning temperature was 101° and the evening temperature 103°, and by the 10th the patient was free from fever, but there was still some delirium. In two or three days, however, this passed away, and he seemed to be progressing very favorably for a week, when he was suddenly taken with violent convulsions, which recurred in rapid succession till his death, twelve hours later. No autopsy could be obtained.

There was but one other fairly well-marked case of typhoid fever among my ten cases. Mr. W. was taken sick on March 14, but I did not see him till the 19th; his temperature then was 104·5°; his pulse was rapid and his skin wet with sweat; he had severe headache, but there was no other disturbance of any kind. His evening temperature did not fall to the normal for four weeks, and ranged during the attack between 103° and 99°. A peculiarity about this case was that the temperature was higher during the first week than at any subsequent time. His bowels were constipated throughout and had to be moved by enemata. There was no eruption in this case, nor was there any tympanites, and though I have placed it in the list of well-marked cases, it was far from typical.

The seven remaining cases presented more or less atypical features, and I shall consider the different symptoms in order to show their atypical course:

(1) The onset was gradual in six cases and sudden in one, commencing in this latter with a chill.

(2) The duration was six days in one case, eleven days in another, fifteen days in a third, eighteen days in a fourth, and over four weeks in the remaining cases.

(3) The temperature in five cases was higher during the first three days than at any subsequent time; the evening temperature on the day that I was called—the first or second day of sickness—being 103·7°, 102·8°, 102°, 101·8°, and 102·6° in the respective cases. One of these cases lasted over four weeks. In the remaining cases the temperature was very variable and the attack in each lasted over four weeks. For example, Mr. A. C. I., a medical student, had a temperature of 102° on the morning of April 1, 103·4° in the evening; on April 3, a. m. 100·6°, p. m. 103·4; April 9, a. m. 99·6°, p. m. 103·5°; these striking variations were entirely irrespective of treatment and were marked throughout the whole attack; this was the only case, except the fatal one already mentioned, in which there was diarrhea.

The following case presents somewhat similar variations of temperature: Mr. D.P. was taken sick on—

Date.	Temperature.	
	A. M.	P. M.
	°	°
March 26	100·5	103
April 1	100·6	103·2
April 3	100·2	101·6
April 9	100·6	99·1
April 11	98·2	99·4
April 15	99	99·9
April 17	99	102

Neither of these patients had ever had malaria in any form, nor did they live in malarial districts, one being from Highland County, Va., the other from Winchester, Ky.

(4) The pulse presented no features of especial interest; it was rarely over 100, except in two cases—the one in which there was hemorrhage from the bowels, and in another, that of Mr. D. P., which ran a mild but tedious course.

(5) *The digestive symptoms.*—There was loss of appetite in all cases after the first week, but during the first week two of the patients complained of being very hungry. Nausea and vomiting were present for a short time in two or three of the cases, but these symptoms were not marked. Diarrhea occurred in only two cases—that

of Mr. G., in which there was hemorrhage from the bowels, and that of Mr. A. C. I.; in both it was very obstinate and troublesome. In all the other cases constipation was a marked symptom. Iliac tenderness was present in five cases, and tympanites in two.

(6) The eruption was present in only two of the ten cases under my care.

(7) The urinary symptoms were not marked. In one case there was retention of urine, requiring the use of the catheter. Ehrlich's test (for diagnostic purposes) was not employed in any of the cases, as previous experience had satisfied me that it was of little value.

(8) Weakness, emaciation, and anemia were marked symptoms in the later stages of all the cases.

I have thought it well to put the history of this outbreak of fever on record for the following reasons:

(1) It furnished a singularly favorable opportunity for studying an unusual source of infection.

(2) In an outbreak—of which the cause could be determined with reasonable certainty—occurring at a time when no form of continued fever was prevailing in the community, we find a number of persons infected from the same source, some of whom presented the typical features of typhoid fever, while others had a fever which would never have been classed with typhoid but for the surrounding circumstances.

It is of course conceivable that the cases that seem to me to be atypical typhoid fever were really of a different character, but in view of the facts that all originated from the same source and all grades of severity were observed, such a conclusion seems to me scarcely tenable.

REST AS A THERAPEUTIC AGENT IN CHRONIC PULMONARY TUBERCULOSIS.

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It is not my purpose to introduce this subject with a review of the opinions held by the profession on the value of rest as a therapeutic agent in general, nor even to cite many of the contributions of recent years as to its utility in pulmonary tuberculosis; and I am induced to bring it to your attention only because of a manifest tendency to overestimate its value and to recommend it as a general means for a cure.

In a recent paper by Dr. Mays, of Philadelphia, read before the American Climatological Association, May 25, 1893, this tendency is particularly manifest, and in it the author compares the condition of the phthisical patient to nutritive bankruptcy, due to excessive expenditure induced by wasting disease, and on that account he advocates rest in bed for prolonged periods as a means for limiting excessive expenditure and for storing up new capital, implying that if the nutrition of the patient be thus restored the disease would then be cured.

Regrettable as it is, this simple formula does not act so specifically as we might wish it to do, and while I insist upon rest under certain complications, in the course of phthisis, as highly essential, I can see in it only an aid toward complying with indications which may or may not be present in a given case. I therefore object to the recommendation of rest just because a patient is a consumptive, and proceed to consider more particularly its indications and limitations as I have found them in the course of my experience with many hundreds of phthisical patients.

I presume that we are all agreed that rest in bed for prolonged periods is not conducive to the best nutrition of the healthy organism; if we resort to it neverthe-

less, we find our subjects soon to lose in appetite, they take and assimilate less food, their muscles become soft and diminish in size, and after a time anæmia and loss of flesh and strength are apt to result. If we attempt to counteract these effects by forced feeding, we find that larger quantities of solid food than the patient's appetite demands, soon lead to gastrointestinal complications and to loathing of the food offered, and that in most cases it is not appropriated even if we can induce the subject to take it. Thus we soon become restricted to a more or less liquid diet, and considerable quantities, even of it, are apt to cause derangements of the digestive organs.

To keep such a healthy subject in good condition under prolonged rest in bed we find it necessary to substitute massage or electricity, or both. Such a subject may then store up fat, which is, however, not always synonymous with improved nutrition.

All this is equally true in chronic pulmonary tuberculosis, as long as no complications have occurred by which the tubercular deposit is caused to break down and to suppurate; in other words, as long as the patient is in the so-called early stage.

Such patient has either acquired or inherited conditions which temporarily or permanently left their stamp upon his constitution and resisting power, and which under the existing mode of life of the individual frequently induce defective nutrition, which makes the tubercular infection possible, or causes it to extend, and these same conditions, as well as the tubercular involvement of the lung, limit the amount of physical and mental labor that can be taken with advantage, but absolute rest for prolonged periods is not only not indicated; on the contrary, at this stage of the disease, an out-of door life with proper exercise, limited for the individual to fall short of the production of sensible fatigue, is highly essential for the improvement of nutrition, and as an aid to an ultimate cure.

I would therefore be understood that in my experience the chronic "*purely tubercular*" affection of the lung is not responsible for the nutritive deficiency, but that the latter precedes the manifestation of the tubercular disease and that the subsequent wasting and fever are not caused by the tuberculosis directly, but are complications which may or may not arise in its course.

In some of the complications which occur in the course of the disease, rest in bed is essential until their removal is accomplished, and among these I may particularly mention pleurisy, hemorrhage, and septic fever. With an acute pleurisy or a pulmonary hemorrhage the patient seeks his bed voluntarily; not so with the septic fever, especially when it is mild or intermittent. Indeed, many practitioners allow their patients to be about and advise exercise, regardless of its presence.

The absorption into the circulation of noxious products which induce the septic fever can only occur when certain other pathogenic germs have gained entrance to the tubercular deposit, causing its softening and breaking down, and without such additional infection tubercular deposits do not undergo suppurative and destructive changes; on the contrary, they remain quiescent for indefinite periods and tend to the development of connective tissue proliferation and fibrosis, which lead to encapsuling and atrophy of the tubercular tissue and thus to a relative cure of the disease.

If now prolonged rest in bed could prevent the additional infection spoken of, or if it could hasten or favor the connective tissue changes and encapsuling of the tubercular deposit before septic infection has occurred, then the treatment could be recommended in the early uncomplicated stages of the disease also; that is to say, for the tubercular disease itself. That it can not do the former I need only mention, and since we can only with difficulty keep such a patient at his present nutrition under absolute rest, it remains only to inquire how and to what degree it may be useful to aid the patient in overcoming septic complications which, when once established, control the entire situation.

In the presence of sepsis, no direct treatment for the tubercular disease can be of avail, and to give such a patient tuberculin, creosote or other supposed specific rem-

edies against tuberculosis, I consider not only useless but as injurious, and as diverting our efforts from the real issue.

Rest in bed becomes now imperative, not because of the tuberculosis, but because of the complicating septic fever, which damages the heart, induces degenerative processes in its muscular fibers, and causes other deleterious effects upon the organism, all tending to wasting and exhaustion of the organism.

Even before the septic fever occurs, the heart of the patient is called upon for extra labor on account of mechanical obstruction in the lung to the free flow of blood from the right to the left ventricle, and on that account the amount of physical and mental labor needs always to be regulated and often materially restricted from the very beginning of the disease. I have heretofore called attention to this subject in a paper presented to the American Climatological Association, entitled "The Detrimental Effects of Over-Exertion in Pulmonary Tuberculosis," and published in the transactions of the association for 1890.

In the presence of such complicating fever, the heart is called upon for additional labor still, and if its contractile power is steadily diminished by the fever, it is not difficult to see that the conditions for passive congestion, hemorrhage, and defective nutrition of the involved lung tissue and the progressive breaking down of the tubercular deposits are highly favored.

The indication under such circumstances is to secure a good heart action and to preserve it by lightening the heart's labor. For the former purpose we nourish our patient as well as possible, and use stimulants whenever they appear necessary. For the latter, rest in the recumbent position is one of our most important means, and it thus becomes an indirect aid to nutrition, not only in septic fever engrafted upon tuberculosis, but in all prolonged febrile states.

I find from a large practical experience that the more severe septic or so-called hectic fevers of pulmonary tuberculosis can not be successfully managed without rest in the recumbent position, and that even slighter degrees are more quickly controlled by such rest; yet in severer cases we can not depend upon rest alone, although without any other aid we note its favorable influence upon the pulse as well as upon the local processes, and observe the cough and expectoration to diminish and the fever to become less intense; nevertheless it is not often entirely controlled, and the patient continues to go down only at a slower pace.

Fortunately we can under such a contingency bring to our aid other very useful remedies, of which deserve particular mention hydropathic applications and the subcutaneous use of nitrate of strychnine; and there are few severe cases of septic fever in connection with tuberculosis in which we are not obliged to resort to one or both to help us through the critical period.

Even so simple an application as an ice-bag over the region of the heart may turn the scale in the right direction, and with the combined therapeutic resources at our command, when wisely chosen and applied, we may bring a severe septic process to an arrestment.

During this enforced rest the application of massage and the exposure of the patient to pure air and sunlight must be carefully attended to; when improvement is well under way and the temperature remains normal, or nearly so, the patient may be permitted to sit up and walk out of doors, beginning with a quarter of an hour, and increasing the time slowly as the general condition and strength will permit.

These liberties must be controlled by their effect upon the circulation, and when unfavorable must be abandoned, to be resumed at a later date. Only when the pulse remains good and is not materially increased in frequency beyond the degree observed in comparative health, and after the temperature has for several weeks remained at or near the normal, can we think of allowing light exercise, and then its employment within the limits of fatigue will be found to aid still more rapid general improvement in the advanced, the same as in the early stage cases.

ON THE OCCURRENCE OF A FORM OF CHRONIC BRIGHT'S DISEASE, OTHER THAN TYPICAL FIBROID KIDNEY, WITHOUT ALBUMINURIA.

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Since Bright first directed attention to the relationship existing between albuminuria and diseases of the kidney, the presence in the urine of serum-albumin in quantity detectable by time-honored tests has properly been accepted to indicate renal derangement. So necessary is this association generally regarded that many otherwise acute clinicians, in pinning faith to the presence of albumin as an infallible guide to the recognition of nephritis, are not infrequently led into the error of interpreting this fact into the necessity of excluding kidney disease with the absence of albumin; for not infrequently do we encounter in published reports of cases, otherwise admirably presented, in which a diagnosis may hinge upon the renal condition, the conclusion stated as if none other were possible, that the kidneys are sound, the urine being free from albumin. Search may also have been made for casts, which, unencountered, naturally strengthens the opinion previously reached. * In such cases no cognizance is taken of often a more important examination, the determination of the nitrogenous output; or of the highly momentous fact, apparently little known, that albumin may be totally absent from the urine throughout the course of chronic Bright's disease, and casts may be only detectable after much search, yet the case progresses steadily to a fatal termination, the remote ailment perhaps never being suspected, either *ante* or *post mortem;* the determining cause of death, a pneumonia or an inflammation of a serous membrane, alone being recognized. It is, indeed, not improbable that chronic nephritis without associated albuminuria is of no uncommon occurrence. That it exists undetected and untreated there is no doubt. It thus must increase to some degree the mortality record of other ailments; death, in these cases, often ensuing less from total renal failure than from visceral or serous complications induced by long-continued partial renal inadequacy.

My attention was first directed especially to this subject by encountering the first two of the cases herein recorded. One of these, with certain symptoms suggestive of decided renal inadequacy, but without those that are usually regarded as typical of chronic Bright's disease, had consulted several clinicians of note in this city, and Charcot in Paris, as to his ailment, which he suspected to be renal because of the small amount of urinary solids habitually excreted; but, because of nondetection of albumin and casts, the case had been dismissed by these as one of hypochondriasis or of neurasthenia. As laboratory work brought me not infrequently into contact with this case, several cursory surveys of the symptoms, subjective and objective, caused me to suspect a latent kidney ailment, despite the negative opinions previously given. I then instituted a careful examination of the urine for sometime. A brother of this patient, with somewhat similar symptoms, who also came under observation, was believed on examination to be affected similarly. Encountering these cases suggested a search for others. A number of these were so soon collected as to indicate that the combination of chronic Bright's disease without albuminuria was of no unusual occurrence, and that I had probably overlooked many instances in the past. It likewise clearly showed that similar cases were undoubtedly commonly unrecognized.

* In instances such as this it is not improbable that a microscopic examination is often not thorough, the absence of albumin prejudging the observer against more than a perfunctory search; for in any condition with nonalbuminous urine, or urine containing but minute traces of albumin, detectable only by most delicate tests, renal epithelia or casts can not be numerous. Their discovery often, then, necessitates painstaking search, even under such favorable conditions as the use of the centrifugal machine, to obtain concentration of sediment and intelligent employment of a low-power lens as a searcher.

Not that the occurrence of this supposed unusual condition is absolutely unknown, or, in connection with symptoms of typical granular or cirrhotic kidney, has passed altogether undetected; for more than four decades ago Wilks,* of Guy's Hospital, the birthplace of our knowledge of albuminuria and of Bright's disease, in first describing the two principal forms of chronic nephritis,† to which description all later English writers have more or less adhered, also pointed out that the granular kidney‡ could occur and run its course quite symptomless, albuminuria sometimes being absent. Since that time, however, though the occasional occurrence of typical fibroid kidney without albuminuria has not been forgotten, the likelihood of its existence has only been recognized by a few. No text-books on general medicine especially notice the occurrence, and few special treatises on renal disease more than barely mention what Wilks observed. Some of our leading authorities fail even to lay stress upon the occasional absence of albumin in typical granular kidney. These not only overlook the class of cases I now report, but neglect to note that, even with classical symptoms of fibroid kidney, such as pale, plentiful urine, fibroid vessels, and hypertrophied heart, occurring at middle life or in the aged, chronic Bright's disease may occur and run its course without albuminuria.

Bartels,§ it is true, cites a case carefully studied in the five weeks preceding death, in which albumin was totally absent from the urine except during a few days in which high fever occurred, due to vaccination. Though with symptoms suggestive of renal fibrosis, because of the absence of albumin, an antemortem diagnosis was not made. In narrating this case Bartels indicates his idea of the infrequency with which similar cases occur, though he states that he has repeatedly witnessed the temporary absence of albumin in chronic Bright's disease.

Jaksch, whose work on laboratory and clinical medical diagnosis is our accepted authority, totally fails to recognize these cases. He speaks of periods of temporary absence of albumin in granular kidney, but states that an examination of the total twenty-four hours' urine will nearly always reveal its presence, which has not been discovered in a single specimen passed perhaps in the forenoon. Even the late Fagge, under whose eye in Guy's Hospital cases of typical arterio-capillary fibroid kidney, reported by Mahomed, were studied, in which albuminuria was absent or was but an inconspicuous feature, lays little emphasis upon such a combination in his splendid classic on medicine. Our own writers on general medicine remark still less the occasional absence of albumin in these cases. The most recent and most widely read text-book is that of Osler, a name occupying a preeminent position in medical science. This work, because of its inherent worth, embodying the results of years of faithful observation and patient research, and because of the deserved wide fame of the author, is easily first of its kind. Yet Osler, too, here fails to assist in the recognition of the class of cases in question. He speaks only in this relation of that variety of granular kidney, such as was described by Wilks, in which polyuria is common. In this he merely states that traces of albumin are found, but may be absent at times, particularly in the early morning urine.

But two writers on diseases of the kidney, and these Americans—Millard and

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* *See* Guy's Hospital Reports, Vol. VII, second series.

† The term nephritis is not used here in a strict pathological sense, but refers equally to true inflammation of the renal structure as to a condition which is actually *noninflammatory*, but of the nature of a degeneration. Sir William Gull pointed out, in describing the arterio-capillary fibroid kidney (American Journal Medical Sciences, 1886, Vol. XCI, p. 407) what previously, I believe, had been recognized by others, that the renal changes are not really of an inflammatory nature, so that the term *nephritis* is strictly not justified here. There is no acute stage; no acute hyperæmia; no diapedesis of leucocytes and blood cells, characteristic of ordinary inflammation; and no local or general symptoms indicating nephritis.

‡ Looked upon Wilks as an indication of senility, with its associated tortuous thickened radials, characteristic pale abundant urine, and tendency toward uræmia or apoplexy.

§ V. Ziemssen's Cyclopædia, Vol. XV, p. 440.

Purdy*—have especially directed attention to the occurrence of chronic nephritis without albuminuria, referring, however, only to the usually described variety of granular kidney with typical symptoms. Millard relates two cases in which albumin, though frequently examined for, was at no time found. One of these was shown *post-mortem* to be interstitial nephritis, with a limited glomerulo-nephritis. The second was a probable case of renal fibrosis. Death did not occur while this case was under observation. The general health was good. Casts were repeatedly found in the urine, though albumin remained absent.

Both Millard and Purdy refer to the important papers by Mahomed†, in which are analyzed a number of cases of granular kidney, under observation in Guy's Hospital during 1879 and 1880, in which albumin was more or less constantly absent from the urine in the period in which observations were made. Most of these cases were in the degenerate period of life, with fibroid arteries and hypertrophied heart, but were without special symptoms referable to the kidney.

Though a strikingly interesting series of cases, and ably reported by Mahomed, his description of at least a minority of them‡ does not make it clear that renal disease was a certain accompaniment of the symptoms described—referable in the main to other organs In this minority, no account of microscopic examination of urine is given, and in a number of cases the urine is described as normal. Estimations of nitrogenous excretion in any save a few, and in these to but an imperfect extent, were also not attempted. In a few of those in which death occurred while under observation and a necropsy was obtained, the kidneys were also stated to be healthy, though the cases were regarded by Dr. Mahomed as those of chronic Bright's disease, as he understood the term.§

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* The former in his work on Bright's disease; the latter in a special paper, "The pre-albuminuric stage of chronic Bright's disease," Chicago Medical Journal and Examiner, May, 1885. Purdy refers only to the typical arterio-capillary fibroid kidney of Sir William Gull. Curiously, in his work on Bright's disease, published a year subsequent to the appearance of this paper, Purdy barely states, in discussing cirrhosis of the kidney, that "albumin may be temporarily absent in the early stage, but as a rule it will be found, if it is sought for over a sufficient length of time."

† "The clinical aspect of chronic Bright's disease," Guy's Hospital Reports, 1879, Vol. XXIV. "Chronic Bright's disease without albuminuria," Guy's Hospital Reports, 1880–'81, Vol. XXV.

It is necessary here to state that in reviewing Mahomed's statistics, Dr. Purdy places the figure of nonalbuminuric cases among these as too high. He also assembles with these, I think improperly, 76 cases out of a total of 98 in which a diagnosis of Bright's disease was not made, observed at the Birmingham General Hospital, reported from post-mortem records by Dr. Saundby, in a paper "On the occurrence of dropsy in granular kidney." Though it is not stated by Saundby that albumin was searched for in the urine of the 76, Dr. Purdy thinks that it may be fairly assumed that such examinations were made, since the cases were under observations in hospital, and perhaps subject to the usual rule for daily examination of urine. But as many of these were cases of hernia, bronchitis, fractures, amputations, burns, ulcers, skin diseases, and the like, in which a urine examination could not have seemed especially indicated, and as no account of such examination appears in Saundby's report it is unfair to assume that albumin was habitually or even occasionally absent. [Since writing the above note, Dr. Saundby has kindly informed me by letter that Dr. Purdy is wrong in his assumption; that so far as he (Dr. S.) knows, no examinations for albumin were made; the cases came from anybody, and that he knew nothing of their clinical history. Dr. Saundby also tells me that he does not think albuminuria often absent in Bright's disease.] In the first report of Mahomed's, on 100 cases of granular kidney observed in Guy's Hospital, in which death occurred in 26 directly from kidney disease, it is stated by Mahomed that albumin was absent from the urine, not in all, but in a large proportion (exact number not stated), so that Dr. Purdy's figure of 74 per cent of nonalbuminous urine in 259 cases of granular kidney (Mahomed's and Saundby's) is not a little excessive. Apart from this, as I have elsewhere stated in this paper, it is not certain that a number of Mahomed's cases, though perhaps rightly styled by him cases of chronic Bright s disease, as he understood this term, were in reality suffering from actual renal disease.

‡ Such as cases 16, 17, 18, 19, 22, 23, 24, 25, 27, 30, 37, 42, , 43, 47, 48, 52, 53, and 56.

§ As a result of certain considerations, which Dr. Mahomed thought supported his view, he recognized three stages of chronic Bright's disease. Of these the first, a functional stage, he regarded as limited to a condition of simple persistently high arterial tension, without organic changes in the vascular system or in the kidneys. This stage, he believed, might precede for years the onset of degeneration in the kidney. The second stage, he termed chronic Bright's disease without nephritis—using the term nephritis in the strict pathological sense of a true inflammatory condition of the kid-

Mahomed adopted the term chronic Bright's disease as a convenient generic name for a condition which Gull and Sutton had previously described of generalized arterio-capillary fibroid change. Contrary to the view of Johnson, an extension of that of Bright, and following in the lead of the above-mentioned investigators, Mahomed viewed the condition underlying the various stages of granular or fibroid kidney as a systematic disorder in which the cardio-vascular alterations were not dependent upon, but either antedated the development of the kidney fibrosis, or, more rarely, existed without renal change.* It was not necessary for him that the kidney should actually be the seat of degeneration to constitute Bright's disease. Fibroid kidney was but an unnecessary, if more or less to be expected, incident in the general morbid state. Renal fibrosis did not always appear, though general arterial change occurred. Yet Mahomed thought kidney alterations present in most of the cases he reported at this time, although in a number of them, as has been stated, there seemed no positive evidence of this, and in two it is recorded that a necropsy showed healthy kidneys.

Mahomed's views were extreme in that he regarded a thickened vessel as a certain forerunner of fibroid kidney, if the latter were not already existent. Without desiring to discuss here the still unsettled question as to the sequence of events in chronic Bright's disease, whether cardio-vascular alteration precedes or accompanies the renal, claiming a common origin, or follows the latter, dependent upon kidneys already inadequate through disease, I may say that I am by no means prepared to admit that a diseased kidney is the sole cause of increased vascular tension and subsequent arterial degeneration; nor can I accept Mahomed's teaching that persistent high arterial tension or a thickened vessel is a certain indication of present or expected kidney change.†

Apart, however, from the doubtful cases of renal disease among those reported by Mahomed in which albuminuria was absent, there remain a good number in which, with the urine free from albumin, undoubted granular kidney existed. Be that as it may, Mahomed's cases were all in middle or advanced life. There were present decided cardio-vascular changes, such as hypertrophied heart and thickened vessels. These cases were reported especially to show that in the stage of Bright's disease in which epithelial alterations in the tubules were absent—or, if occurring, were but transitory in character—albuminuria was absent, the urine remaining practically normal, and symptoms referable to the kidney, i. e., those of renal inadequacy, were uncommon. Death in these cases, as Mahomed remarks, is usual in granular kidney, resulted from failure of other organs, notably the heart.

The few cases I here report, in which the character of symptoms, together with result of frequent urine examinations, leave no doubt as to the existing diseased kidneys, although albumin is absent from the urine, are of a class distinct from the cases hitherto described in which a diagnosis of fibroid kidney could be made from the association of age with cardio-arterial disease and with such a common symptom as abundant, low-gravity urine. In the latter, apart from general fibroid changes,

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ney. In this stage the organic changes are apparent in the vascular system and in the kidney (arterio-capillary fibrosis—red granular kidney). The kidney, post-mortem, is found to be the seat of interstitial change, without epithelial alteration. In the third stage, which Mahomed classed as chronic Bright's disease with nephritis (the mixed or mottled granular kidney), he regarded as the natural but by no means invariable termination of the ailment. In this stage, epithelial changes have occurred in the kidney, the cirrhotic alterations are marked, and the symptoms of renal disease prominent. This, he stated, is the stage in which the disease is usually diagnosticated. The 61 cases which he reported characterized by the absence of albumin from the urine, he considered as belonging to the second of these stages.

*See preceding foot-note.

†Mahomed styled a high-tension radial a *renal* pulse. He suggested that visible and tortuous temporals were an indication of renal disease, and regarded this as a point to aid in the separation of a mitral insufficiency, the result of a previous rheumatic endocarditis, from that arising from overstretching of the left ventricle as a result of resistance *a fronte* in the arterial sclerosis of fibroid kidney.

the kidney was in most cases fairly healthy and functionated accordingly. In my cases, without cardio-vascular symptoms other than increased tension, there are present those referable to the kidney, with, in several, marked renal inadequacy, both as regards excretion of water and of solids.

In the urine examinations of all the cases here recorded, the following methods were employed: Albumin was in every case examined for in mixed specimens of the twenty-four hours' urine, as well as in single specimens voided at varying times in the day. The tests used were a saturated solution of plain picric acid—this was in every instance the test first applied to each specimen of urine examined;* Millard's phenicacetic acid solution†—this was used when no response occurred to picric acid, and on other occasions to confirm results obtained by picric acid; metaphosphoric acid was also often employed, not alone, but in addition to the other tests. Indications of even a slight contact ring occurring to picric acid or Millard's solution, either immediately or after standing for some time, a second specimen of urine was treated with glacial acetic acid. If the urine was concentrated—rich in salts—an excess of acid was added to insure complete precipitation of any mucin present.‡ This, after agitation, was subsequently filtered and the filtrate exactly neutralized with strong (25 per cent) NaHO solution.§ The filtrate was then slightly acidulated with acetic acid and the various tests above mentioned once more applied. Any indications of response now occurring, separate portions of the urine were further carefully tested with heat, with HNO_3, and often also with acetic acid and potassium ferrocyanide.

In all the microscopic examinations the centrifugal machine was employed to ob-

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* Recent experiments in these and in other cases have convinced me that even plain (unacidulated) picric acid solution *will* precipitate mucin. This I had before doubted, on the authority of Johnson, and was inclined to accept as an indication of serum-albumin any slight though sharply-defined ring obtained by the contact method with cold picric acid solution and *clear* urine, not subsequently dissipated by heat. Recent experiments have shown me that mucin is occasionally present in non-(serum) albuminous urines in amount sufficient to respond to the picric acid test even so applied, and also to Millard's test, and to metaphosphoric acid. This is not, however, usual, as I have repeatedly failed to obtain any response to clear urine by the overlying method with plain or citrated picric acid, examining the tube even after several hours' contact. It is usual to obtain a mucin reaction to the boiling test with acetic and picric acid, which is improperly sometimes employed as a *delicate* test for serum-albumin. The slight cloud obtained with acetic acid and boiling, in urines not rich in salts, is undoubtedly often due to mucin, as can readily be proved. Fortunately little harm can usually result, in cases of suspected kidney disease, from the error of mistaking mucin for serum-albumin, since the presence in the urine of the former, with evidences of renal derangement, is often only the precursor of the latter, and probably arises from faulty metamorphosis of the cells of the renal tubules—of course, excluding vesical, urethral, and vaginal catarrh as a factor in its production.

With several years' steady use of the picric acid test, I still regard it as the most delicate reagent for the detection of traces of albumin, and, intelligently used, as the best of the many tests in use. Millard's phenic-acetic acid test I rank second, and frequently use. It must be recalled that this also, like picric acid, will respond to so-called peptones, to mucin, and to urates. Response, therefore occurring with these, unless very decided and leaving no doubt as to its nature, requires confirmation by the method above suggested. Tanret's solution, and other tests with mercuric chloride and those with tannin, such as Sebelein's reagent, are unreliable for the detection of albumin because of other sources of error even than those just mentioned. The same may be said of the trichloracetic acid test.

†Glacial carbolic acid (C. P.) 95 per cent, ℥ij; glacial acetic acid (C. P.) ℥vij; mix and add solution of potash, ℥ij, ℥vj. Filter. The specific gravity of this solution is 1027.

‡Concentrated urines, rich in salts, will not yield mucin, if present, to a small amount of acetic acid. An excess of that necessary to form acetates with the salts present must be added before precipitation can occur. This is a practical point of great importance little attended to.

§NaHO was used in preference to KHO, as an excess of the potash salt present in the urine would, in subsequently testing with picric acid, form a precipitate of potassium picrate, thus interfering with the reaction for albumin. A strong solution of alkali was used, so that if but traces of albumin were present the latter be not so diluted by addition of these reagents as to cease to respond to tests used for its recognition.

tain a sediment, and usually from the precipitate taken from the urine which had been standing for some hours.*

Urea was estimated by the hypobromite process (bromine itself always being employed), with a modification of the Russell and West apparatus, which, as comparison with a tried and more complicated apparatus had shown, was very accurate clinically.

Uric acid was estimated by the method of Haycraft. Acidity, when taken, was estimated by titration with $\frac{N}{10}$KHO or NaHO. The chlorides were estimated as total chlorine by Volhard's method.† The figures indicating total urinary solids‡ in the tables are simply calculated in grains by multiplying the last two figures of the specific gravity by the number of ounces of urine passed in the twenty-four hours.§ This method, of course, furnished only a very rough approximation, but used with coincident urea, or urea and chlorine estimations, it is all that is necessary. It alone may be made to furnish results of some clinical accuracy, provided the amount of NaCl excreted is also ascertained.‖ It is, of course, most essential that an accurate urinometer be employed and corrections for temperature made.

Case I.—W. B., analytical chemist; aged 29 years; unmarried; weight, 147 pounds. No history of lead, syphilis, or alcohol. Habits studious and temperate. No diseases of childhood. As a boy, robust. Family history as to renal or cardiac disease negative. His father has been a generous liver, and has had several attacks of typical gout. For the past three years W. B. has suffered from severe headaches and incapacity for exertion, worse in the latter half of this period. Constant headaches and muscular weakness have been present, increased by slight physical exercise or mental strain. Two years ago, during a period in which he was feeling particularly bad, his urine, examined by himself with nitric acid, showed the presence of albumin. This was discovered in a single unmixed specimen of the morning urine, and once only, though often afterward frequently examined for. An estimation then of the total urinary nitrogen excreted showed a considerable diminution from the normal. Fancying himself the subject of kidney disease, he shortly after this consulted at odd times several practitioners in this city, and in the summer of 1892 Charcot, in Paris. These were unable to find either albumin or casts in the urine, and gave on this account a negative opinion as to renal disturbance, though the symptoms certainly were suggestive of grave inadequacy. There was no improvement on the lines of treatment suggested, but rather an aggravation of symptoms. After a course of spinal and loin douching under Charcot, loin pain developed, which is now present, with headache, vertigo, and general malaise on any extra exertion or when a nonnitrogenous dietary is departed from. There is but little

* Both the two-bottle milk-testing machine made by Mr. J. E. Lonergan & Co., of this city, and the equally efficient, and, for clinical work more practicable, smaller apparatus of Messrs. Queen & Co. were used. The utility of the centrifugal machine as an aid in the production of urinary sediment for microscopic work is great indeed. In my experience the deposit resulting is both richer in quality and quantity than that obtained by gravity. Clear urines showing little or no sediment after some hours' standing can be readily made to yield a precipitate by its use, and casts but scantily present in the sediment resulting from standing without its employment, which might not be found, can often readily be secured by the aid of this adjuvant to the production and concentration of a precipitate.

† Estimations of chlorides were made as probably the most important mineral constituent of the urine, and that which has been found diminished in cases of chronic nephritis.

‡ Normally, the total urinary solids excreted average about 65 grams, or 1,000 grains. The daily amount of urine averaging 1,500 cubic centimeters (50 fluid ounces), and the specific gravity = 1,020, then 50 × 20 = 1,000 grains, or 66 grams. The average daily output of urea is between 30 and 40 grams (450 to 600 grains), or about one-half the total solids, the amount varying considerably with sex, body weight (about 1 gram should be excreted for each 5 pounds of body weight), and amount and character of food eaten.

Daily excretion of chlorides, calculated as NaCl, equals 10 to 15 grams (154 to 246 grains), or somewhat less than one-half the urea. Calculated as chlorine, chlorides equal 6 to 9½ grams. The daily amount of uric acid excreted is varyingly placed, the average probably being 0.5 grams (7 to 10 grains).

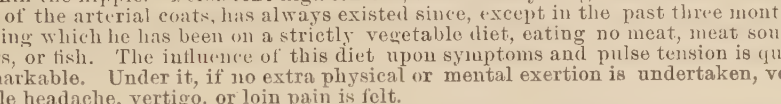
§ This method is much more convenient, and gives approximate results of greater accuracy, than those obtained by the use of Christoson's (Haesen's) or Trapp's formula. It furnishes a figure midway between that of the two. By the former the last two figures of the specific gravity are multiplied by 2·33; the resultant is multiplied by the total number of cubic centimeters of urine passed. This product divided by 1000 = the total amount of solids in grains. Trapp's factor is 2.

‖ As my friend Dr. Leffmann suggests to me.

anæmia. Digestion is fairly good. No indications of external œdema have ever been noticed. There are no eye changes. I have had the case under observation about a year and a half. When first examined physically shortly before this, persistent high arterial tension was noted, with accentuation of the aortic second sound at the apex. The area of cardiac dullness was not increased, nor has it since become so. The apex beat is still in the normal situation, about two inches below and a half-inch within the nipple. Persistent high tension, without as yet signs of notable thickening of the arterial coats, has always existed since, except in the past three months, during which he has been on a strictly vegetable diet, eating no meat, meat soups, eggs, or fish. The influence of this diet upon symptoms and pulse tension is quite remarkable. Under it, if no extra physical or mental exertion is undertaken, very little headache, vertigo, or loin pain is felt.

The accompanying sphygmogram is one of several, all practically similar, taken at various times after having been between two and three months on a nonnitrogenous diet. It is practically a normal tracing, showing a moderate degree of tension.

FIG. 1.



W. B., June 10, 1893. Pressure, 1½ ounces; sitting.

Since the single occasion on which he detected albumin in his urine by nitric acid, two and a half years ago, very frequent observations, in both mixed twenty-four hours' specimens, and that passed at various times in the day, have never resulted in showing the slightest trace to heat or to nitric acid. For a long time metaphosphoric acid was used in addition to heat and nitric acid, as a more delicate test for the recognition of small amounts. Though the tests with the last named were always resultless, a slight response was often obtained with metaphosphoric acid; but as mucin, also precipitated by this acid, was not eliminated as a source of error, minute traces of albumin may or may not then have been present, as they are occasionally now.

When urine is ordinarily pronounced albumin free, it is meant, almost without exception, absent to tests commonly employed, such as heat and nitric acid, which, applied with care, detect albumin in small amount, but not in minute traces (less than 1 to 100,000).* In the cases of granular kidney before referred to, such as those of Wilks and of Mahomed, in which no albumin was found in the urine, heat and nitric acid were the tests probably employed for its detection.† In my cases the absolute absence of albumin was most usual, for during the period in which examinations were made, as a rule, reactions did not occur to tests (picric acid, the phenoacetic acid solution) showing traces as minute as 1 to 200,000 to 300,000.

In the past year, besides examinations by the patient and by myself, with picric acid as the reagent, of a number of unmixed specimens at short and more lengthy intervals—specimens passed at various times in the day, as regards food and exercise—I made careful daily tests of mixed twenty-four hours' samples in the period named in the accompanying table, except when piperazin was taken. As a rule, not a trace of a response could be obtained with the untreated, clear urine overlaid with picric acid; occasionally a mucin response occurred, and, rarely, a ring which further treatment showed to be serum albumin. No marked response was ever thus obtained to the picric acid or Millard's solution, and the results were always negative with heat and with nitric acid. In microscopic examinations, at various times, of specimens of the mixed urine typical granular and hyaline casts, broad and narrow, were found on several occasions, but never in any amount, and only after some search. Cylindroids were also present. Besides a variety of epithelium from the bladder and its accessories and cells of undetermined origin, occasionally those typical of the

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*I accept this limit of reaction, more extreme than is usually given, on the authority of Millard (Bright's Disease, third edition, p. 85).

†In a very courteous letter recently received from Dr. P. H. Pye-Smith, senior physician to Guy's Hospital, he informs me the tests employed by Dr. Mahomed were: (1) Heat, with the addition of acetic acid, to neutralize alkalinity, if present, and to neutralize any calcic phosphate precipitated by heat; (2) cold nitric acid, carefully overlaid by the urine. Dr. Pye-Smith also says that, though other tests, such as ferrocyanide of potassium and acetic acid, acidulated brine, and picric acid were employed from time to time in the hospital in 1879 to 1881, the date of Mahomed's observations referred to, the tests by heat and by nitric acid only were those in constant use in the wards. Had other than these two been used by Dr. Mahomed in his observations, Dr. Pye-Smith remarks, Mahomed would have mentioned the fact in the Guy's Reports.

convoluted tubules were seen in small number. Isolated pus cells also were occasionally encountered. An abundance of calcium oxalate crystals were present in nearly all specimens, and often considerable free uric acid. Spermatozoa were occasionally seen. As a rule, the urine, of light amber color, yielded but little sediment, and in cool weather remained undecomposed longer than is common. But while piperazin was being taken, sediment was abundant and decomposition occurred early, as is usual. At this time but three microscopic examinations were made, and these were cursory. No casts were seen. There was an abundance of bacteria, calcium oxalate crystals, free uric acid, ammonium urate, and amorphous urates.

The following is an analysis of the most important constituents of the urine over a period of twenty-three days. Much more fluid was ingested than was required to satisfy thirst, during the greater part of this time, in order to stimulate the kidneys to greater activity. Schering's piperazin, in doses of five grains four times daily, was tried for the same purpose for a period of a week. Apparently the only effect of the piperazin was to render the urine more readily decomposable without markedly lowering acidity. The average daily quantity of urine passed in the twenty-three days (1085 c. c.) is in excess of that usually voided. Polyuria has at no time existed. Prior to onset of symptoms of renal inadequacy the urine had been of normal amount. Subsequently it was commonly diminished in quantity, and has remained so. Nitrogenous excretion during the twenty-three days, though in excess of that passed when analyses were made by himself some months previously, is considerably below (100 to 150 grains daily) what should be excreted by a healthy male adult in active life. Though on ordinary diet during this time, urea elimination was only about one-half the normal average of 35 grams (18.56 grams). The daily average ratio of uric acid to urea (1 to 26) is much lower than what is regarded as normal. In this case, urea excretion being diminished and elimination of uric acid probably not being interfered with, the ratio would, of course, be less than the physiological figure of 1 to 40 or 1 to 50. The average excretion of chlorides (as chlorine) is considerably below normal. This, however, does not necessarily indicate impaired renal excretion, though the latter is probably here present, as other causes, notably gastric hyperacidity or hypersecretion, which, apart from renal inadequacy, produce similar diminution, are absent.

Date.	Daily average amount of urine, cubic centimeters.	Daily average amount of urine, fluid ounces.	Color.	Specific gravity of mixed 24-hour specimens.	Degree of acidity, calculated on 100 cubic centimeters of urine.	Daily elimination of urea, in grams.	Daily elimination of urea, in grains.	Daily elimination of uric acid, in grams.	Daily elimination of chlorine, in grams.	Approximate daily amount of fluid taken.	Remarks.
1893.										*Pints.*	
Jan. 31	1740	58	Light amber...	1013	7	22·70	352	·764	(*)	Over 4	Meat diet throughout the 23 days.
Feb. 1	1650	55	....do	1014	11	18	277	·329	(*)	Over 4	
Feb. 2	1400	46⅔	....do	1015	18	20	308	·950	(*)	Over 4	
Feb. 3	1390	46⅓	....do	1012	20	19·50	300	·780	5·60	Over 4	
Feb. 4	950	35	Darker amber..	1021	20	19	292	·729	4·20	1⅝	
Feb. 5	920	30⅔	....do	1020	13	18·40	283	·934	4	1⅝	
Feb. 6	770	25⅔	....do	1020	24	17·75	273	·569	2·70	1⅝	
Feb. 7	1160	38⅔	Light amber...	1015	15	21	322	·779	3·50	2¼	
Feb. 8											
Feb. 9	1550	51⅔	....do	1016	.....	21·75	335	·989	6·37	2½	
Feb. 11	931	31	....do	1018	15	18	277	·729	(*)	2¼	gr. xx piperazin taken.
Feb. 12	1130	37⅔	....do	1020	20	23·75	365	·987	4·50	2¼	Do.
Feb. 13	875	29	....do	1021	20	17·50	269	·666	3·50	2¼	Do.
Feb. 14	700	23⅓	....do	.....	49	19	292	·600	4·60	1⅓	Do.
Feb. 15	850	28⅓	....do	1021	30	15	237	·456	2·20	1⅓	Do.
Feb. 16	1025	34	....do	1021	25	16·80	258	·725	6·45	1½	Do.
Feb. 17	960	32	Darker amber..	1022	22	16·32	251	·693	3·50	1½	Do.
Feb. 18	1400	46⅔	....do	1021	20	19·60	201	·700	7·10	1⅓	
Feb. 19											
Feb. 20	1025	34	Light amber ..	1021	20	20	308	·725	5.50	1½	
Feb. 21	955	31⅔	Darker amber..	1024	25	20	308	·765	6·35	1⅓	
Feb. 22	1000	33⅓	Light amber...	1021	18	22	338	·924	5·25	1½	

* Not estimated.

Average daily amount of urine passed, 1085 c. c., or 36 fluid ounces; average daily amount of urea excreted, 18·56 grams, or 285·82 grains; average daily amount of uric acid excreted, 0·713 grams, or 11 grains; average daily ratio of uric acid to urea, 1 to 26; average daily amount of chlorides calculated as chlorine (18 days), 4·82 grams; approximate daily average amount of total urinary solids, 43 grams, or 666 grains.

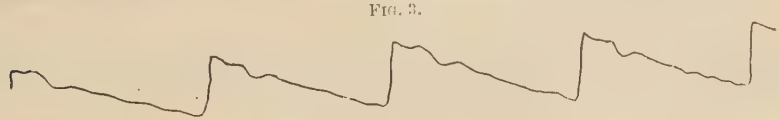
Case II.—J. B., aged 31 years; brother of Case I; unmarried; best weight 140 pounds. No lues; no lead-poisoning. Had slight attack of scarlatina when aged eight years; no complications attended it. Between the ages of 18 and 20 occasionally drank a trifle to excess of beer and wine; but excess for him would be moderation in another of more robust build. He was easily affected by alcohol. Has been very temperate since 20 years of age. Has always been looked upon as delicate; was in best condition when roughing it on the plains four years ago. Began to visibly fail in health two years ago, shortly subsequent to a two weeks' vacation, during which he had indulged in a little mild dissipation incident to hotel life at a fashionable seaside resort. Lassitude, attacks of severe headache about vertex and nucha were first noticed. Spells of headache have since been frequent. Though these appear independent of exertion, they are especially induced by it, especially by a long walk, as is the case with the brother. More or less steady pain across the loins has been noticed for over a year. Accompanying it is a feeling of tired, weak back. During the past six months vertigo has frequently accompanied headache. These are often present on rising in the morning. Recently an attack of vertigo occurred, in which he states that, though he did not lose consciousness, he felt "queer" and nearly fell. He was dazed afterward and was not himself for over two days. Digestion has never been above the average. Within the past year

Fig. 2.

Pressure, 1½ ounces.

it has been impaired. He is flatulent, and nausea after meals is frequent. A stomach examination recently made showed motility lowered, with diminution in free HCl. The latter is probably usual. There is no venereal addiction, and no seminal losses occur. There are no cardio-vascular changes evident. Apex of heart is in normal situation. At the time of the first examination a systolic murmur was noticed, most distinct immediately below and to the left of the apex. It was also distinct in the axilla. It was inconstant, audible steadily for two or three min-

Fig. 3.



Pressure, 1¾ ounces. Pulse, 60.

utes, and then not evident save with chest fixed in full inspiration. On each occasion the second sound at the apex was much accentuated. The murmur could not be distinguished when a cardiac examination was again (and last) made, several months after the first. There is no history of rheumatism. The pulse tension, when first under observation, was high. Later, after some time on a strictly vegetable diet, without meat, meat soup, fish, or eggs being eaten, it is quite normal, as the accompanying sphygmogram (Fig. 2), one of a number similar, shows.* No tracings were taken before meat was abandoned.

Immediately after first sphygmogram was obtained a meat diet was begun. Tracing second (Fig. 3), taken one week later, indicates the effect of retained nitrogenous waste on the pulse. Meat then had been eaten somewhat freely once to twice daily. Other conditions which might modify the tracings were similar. The sphygmogram shows a typical high-tension pulse,† indicative of inadequte kidneys.

The eye-ground, kindly examined for me by Dr. Schneideman, shows nothing abnormal.

During the past two years the urine of different periods of the twenty-four hours has been frequently and carefully tested for albumin by heat, nitric acid, and metaphosphoric acid by the brother, who is a skilled chemist. A response has never been obtained to heat or to nitric acid. Occasionally, though more rarely than in Case I, a slight reaction has occurred to metaphosphoric acid and to picric acid; but mucin not having been eliminated, it is uncertain if the response was due to serum-albumin. Since February, 1893, the urine has been frequently tested by myself. The

*The upstroke is vertical, the tidal wave slight, and below a line drawn from the apex of the upstroke to the aortic notch (Mahomed's test of low tension). The pressure used was 1¼ to 1½ ounces, a greater amount extinguishing the pulse, which was 74, taken sitting.

†The upstroke is less vertical, the tidal wave more pronounced, a portion of it occupying a position above a line drawn from apex of upstroke to aortic notch, which latter is placed high. Pressure from 1¾ to 2 ounces, no minor pressure tracing pulsations. Pulse, 60; that and tracings taken sitting.

result has always been negative with heat and with nitric acid. On three occasions a reaction has been obtained with picric acid. In one of these only was acetic acid used to remove mucin by the method before mentioned. On that occasion only, the untreated urine was also tested with Millard's solution. No trace of haziness or ring occurred, and after removal of mucin by acetic acid no trace of response could be obtained with picric acid. Granular and hyaline casts have been found on several occasions. Hyaline were in excess of the granular, but even hyaline occurred only in small number, as in Case I. A few epithelia, the character of which indicated their probable origin from the convoluted tubules, were also occasionally encountered. Calcium-oxalate crystals abounded in all specimens examined, whether the urine was examined immediately after voiding or, as on some occasions, after standing twelve to twenty-four hours.

An analysis is subjoined of the most important constituents of the urine for a period of six days. The amount, specific gravity, and total daily output of nitrogen, frequently before estimated, tallies so closely with this that it may be accepted as a sample of the usual condition. These also agree, as do the clinical symptoms, with those of Case I. Uric-acid elimination, however, in Case II is somewhat higher than in Case I. The ratio to urea is 1 to 24.

Date.	Daily amount of urine passed, in cubic centimeters.	Daily amount of urine passed, in fluid ounces.	Specific gravity of mixed 24-hour specimens.	Color.	Degree of acidity, calculated on 100 cubic centimeters of urine.	Daily elimination of urea, in grams.	Daily elimination of urea, in grains.	Daily elimination of uric acid, in grams.	Daily elimination of chlorides, calculated as chlorine.	Daily elimination of total urinary solids, in grains.	Approximate amount of fluid drunk, in cubic centimeters.
1893.											
Feb. 28	875	29	1026	Amber.....	34	13·88	200	1	6·75	654	800
Mar. 1	870	29	1028	....do.....	30	14	215	·646	6·50	832	800
Mar. 2	900	30	1029	....do.....	40	18	277	·814	6·85	870	800
Mar. 3	900	30	1030	....do.....	(*)	22·50	346	·740	7·40	900	800
Mar. 4	900	30	1030	....do.....	30	21·60	322	·749	8	900	800
Mar. 5	850	28½	1028	....do.....	30	22	338	·828	5·50	784	800

*Not calculated.

Average daily quantity of urine, 882 c. c., or 29½ fluid ounces; average daily elimination of urea, 18.66 grams, or 287 grains; average daily elimination of uric acid, ·794 grams, or 12 grains; average daily elimination of chlorides calculated as chlorine, 6·8 grams; approximate average daily elimination of total urinary solids, 53 grams, or 816 grains.

The following case is apparently of a type similar to the preceding, though of an age and with symptoms indicating a more advanced kidney ailment. The patient came under observation while this paper was in process of preparing. I could not forbear reporting the case at this time, though not studied for a lengthy period, because of its suggestiveness. In the few days that opportunity has permitted seeing the case, it has been carefully studied. Whether the urine has been previously, as now, altogether albumin-free, or whether in the future this condition will continue, it is, of course, impossible to more than conjecture. But that it should be so now, when marked renal incompetence and symptoms referable thereto are present, renders it well worthy of mention in connection with the other cases:

Case III.—J. MacC., aged 55 years; married; weight, 150 pounds; stationary engineer. No history of lead, syphilis, or alcohol. First seen June 11, 1893. About a year before he had been much overworked and had what was regarded as a slight attack of influenza. He had had no severe ailment prior to this and had always been robust. During the past nine months he had visibly failed in health. There was increasing general muscular weakness and incapacity for exertion. Generalized headache was common, and, lately, had increased in severity; it was worse toward afternoon and at night, and was associated with sleeplessness and, on rising in the morning, with vertigo. The bowels were always inclined toward constipation, but had been maintained in a soluble condition by aperients. No other digestive disturbance was present. Tongue was moderately clean. Appetite was poor. Shooting pains occasionally occurred about the body. No indications of œdema were present, nor had there ever been, so far as he could tell. Knee jerk, station, and tactile sensation were normal. Some tremor of lips and rather pronounced of hands, on extending the latter, were remarked. Temporals are prominent and radials tense, but the arterial wall was not more than slightly appreciable to the finger

when emptied above by pressure. The pulse was small and gave the suggestive tracing of high tension, shown in the accompanying sphygmogram.

FIG. 4.

J. MacC. Pressure, 1¾ ounces; sitting.

The second aortic sound was markedly accentuated at the apex, but the heart's impulse was normally placed within the linea mammalis. Both palpation and percussion showed no cardiac hypertrophy. He habitually passed but a moderate amount of urine, never rising at night. The color, so far as he had noticed, is never very light.

His condition at the first visit, when the above symptoms were noted, suggested either plumbism or chronic Bright's disease. But as there was no blue line, history of colic, or other suggestive symptoms of the former, and as he had not worked at the branch of his trade for a year or more which necessitated handling lead, and no other source of exposure was evident, I informed him, on his asking for an opinion as to the nature of his ailment, that I felt confident the seat of the trouble was in the kidney. I then had him send the total twenty-four hours' urine. To my surprise not a trace of albumin could be detected by any test, even the most delicate. The urine was of normal, yellowish-red color, not resembling that of a case of contracted kidney. This, with freedom from albumin and a history of no nocturnal bladder disturbance, was misleading, and had not I been on the watch for such obscure cases and noted that not only the amount of urine but of urea was considerably subnormal, I might have been longer in arriving at an accurate diagnosis.

Careful consecutive daily examinations of the twenty-four hours' urine for albumin have been made up to the present writing. The urea, uric acid, chlorides, etc., were also calculated for a period of eleven days. Albumin, examined for daily, has at no time been present, even in the minutest trace. On two consecutive days, when the urine was especially concentrated and the weather excessively warm, a slight ring occurred with picric acid and a trifling cloud with Millard's reagent. But this was undoubtedly mucin. A second specimen treated with acetic acid,* filtered and neutralized with strong NaHO, and then again slightly acidulated, gave no trace of response to these tests, even after standing several hours. Considerable mucoid sediment was always present in the urine after it had stood for some hours. Two microscopic examinations were made and two to three hours occupied on each occasion. In the first examination a medium-breadth hyaline and a narrow granular cast were found. An aggregation of small cells forming a somewhat irregular-shaped epithelial cast was also seen. Free uric acid was present in large amount; calcium oxalate crystals and a few leucocytes were also noted. On the second occasion a sample of mixed urine of two days was used. A number of narrow and broad hyaline casts (8 to 10) were found. Cylindroids, amorphous urates, free uric acid crystals, a few small round and oval nucleated cells with granular contents were also present, but no calcium oxalate.

Date.	Daily amount of urine in cubic centimeters.	Daily amount of urine in fluid ounces.	Specific gravity of mixed 24-hour specimen.	Color.	Daily elimination of urea in grams.	Daily elimination of urea in grains.	Daily elimination of uric acid in grams.	Daily elimination of chlorides in grams calculated as Cl.	Approximate daily elimination of total urinary solids in grains.
1893									
June 12	870	29	1013	Reddish yellow	12·25	188	(a)	(a)	377
June 13	670	22	1013	... do.....	8·78	135	·185	1·80	5289
June 14	520	17½	1026	....do.....	13	187	·340	4·42	350
June 15	500	16	1016	Yellow.....	6·50	100	·168	2·15	256
June 16	410	13½	1013	Reddish yellow	8·20	126	·134	1.57	178
June 19	760	25	1011	Yellow.....	10·64	163	(a)	(a)	370
June 20	670	22	1010	....do.....	6·70	103	·268	1·68	220
June 21	810	27	1022	Reddish yellow	19·20	200	·379	5	590
June 22	570	19	1028	Deep reddish yellow.	12·50	192	·400	4·33	532
June 23	459	15	1029	....do.....	12·15	186	·287	2·75	435
June 24	850	28	1017½	Light yellow.....	17	261	·340	4	485

a Not estimated.

b Exact estimation of the total urinary nitrogen eliminated on the 13th and 14th instants was kindly made for me by Dr. Leffman by the Kjeldahl-Gunning method, to compare the results thus obtained by the more ready approximate method for ascertaining total urinary solids. The figures are: 13th instant, 18 grams or 277 grains; 14th instant, 28 grams or 431 grains.

Daily average amount of urine in the 11 days, 643 c. c., or 21¾ fluid ounces; daily average amount of urea in the 11 days, 11½ grams, or 177 grains; daily average amount of uric acid (9 days), 0·29 gram, or 3¾ grains; daily average amount of chlorides estimated as Cl (9 days), 3 grams, or 46 grains; daily average amount of total urinary solids, 23½ grams, or 362 grains.

*See footnote §, p. 195.

The total daily output of urine and total urinary solids in this case is much diminished. Urea is especially low.

After the eleven daily observations were made, during which the bowels were moved once daily by laxatives, ʒj, three times daily, of potash bicarbonate, taken effervescing with lemon juice, was prescribed, with excellent effect, as a diuretic. This, and free purgation by calomel every third day, caused a prompt amelioration

Fig. 5.

J. MacC. Pressure, 2¾ ounces; sitting.

in symptoms. The pulse tension, however, continued raised, though not so markedly as at first. The accompanying tracing was taken fifteen days after the preceding one, and two days after beginning the potash. He had then been for a week on a vegetable diet. The pulse volume is greater than in the first tracing, with a prominent predicrotic wave. Uric acid was then probably in excess in the blood, and nitrogenous excretion greater than before. The diuretic, mercurial laxatives, and nonnitrogenous diet being continued, recently pulse tension is considerably lower than before, with amelioration in symptoms.

The following is the report of the eye examination in this case, furnished me by Dr. Schneideman:

Vision just short of normal. Fields of normal extent for form and color. Right eye: Nerve head reddened and somewhat hazy; outlines indistinct; marked venous pulse; maculæ normal. Left eye: Not essentially different from right. I think that the nerves are redder and more hazy than is ordinarily met with in conditions of the refraction as noted.

The accompanying case is very similar clinically to the preceding. It was recently seen in consultation with Dr. Lewis Brinton, who has kindly permitted me to report it here. From the absence of albumin, though the symptoms were suggestive of chronic Bright's disease, Dr. Brinton had been somewhat inclined to doubt this diagnosis which he has made, and sought my aid for a verification.

Case IV.—Mrs. M., aged 51 years; weight about 110 pounds. Throughout her life the patient had been subject to headaches, but during the past seven years frequent spells of another character occurred. The ache is in the occiput and nucha. It comes on more often on rising, once in about five days. During the past four or five years she has had backache and loin pain; is tired on slight exertion. Occasionally puffiness about eyes has been noticed. She is very nervous. Appetite is poor. No marked digestive disturbances exist; no vomiting. Pulse shows raised tension, but no thickening of arterial coats. No cardiac enlargement exists. Heart was noted to be irritable. A distinct apical nontransmitted systolic murmur was heard in the early part of the first examination. This was evidently due to temporary incompetence. It could no longer be heard at the end of a half hour, during which she had been sitting quietly. Dr. Brinton had not noticed it before this examination that we made together. Second sound was accentuated at the apex, more distinctly so when the murmur ceased to be heard.

She stated that she had been passing but about a pint of urine daily for some years. Could not recall ever passing a large amount, but may have averaged 3 pints some years ago. The specific gravity of a number of specimens examined by Dr. Brinton ran between 1012 and 1020. Dr. Brinton could never discover even traces of albumin, though he had frequently examined the urine. The specimen examined on the day of consultation was of amber color, specific gravity 1021, and gave no reaction with heat or nitric acid, but a ring occurred with picric acid not dissipated by heat. It is impossible now to state if this reaction was due to serum-albumin or to mucin. The urine was concentrated, and but a few drops of acetic acid were added, entirely too little to precipitate mucin in presence of excess of salts.

A number of other examinations were made, a response occurring only on one other occasion to picric acid, and never to heat and acetic acid, or to nitric acid. But one microscopic examination was made. In this a considerable number of hyaline casts were seen, and one granular cast studded with minute oil globules. There were also present cylindroids, a few leucocytes, a few red cells, and several small, finely granular, nucleated polyhedral cells of apparent renal origin.

The elimination of urea, uric acid, and chlorides in this, as in the preceding case, is much below normal. Estimations could only be made over a period of a few days,

but as the urine is believed to vary little in quantity, the averages here given are believed to probably represent the usual condition.

Date.	Daily amount of urine in cubic centimeters.	Daily amount of urine in fluid ounces.	Specific gravity of mixed 24-hour specimen.	Color.	Daily elimination of urea in grams.	Daily elimination of urea in grains.	Daily elimination of uric acid in grams.	Daily elimination of chlorides calculated as Cl in grams.	Daily elimination of total urinary solids.
1893.									
Apr. 27	480	16	1016	Yellow	7	107	·32	2·18	256
Apr. 28	540	18	1021	Reddish yellow	9	141	·23	2·90	378
Apr. 29	420	14	1020	do	8·40	136	·25	1·75	280
Apr. 30	540	18	1027	Yellow	8·60	132			486

Average daily quantity of urine on 4 consecutive days, 500 c. c., or 16 ounces; average daily quantity of urea on 4 consecutive days, 8¼ grams, or 127 grains; average daily quantity of uric acid in 3 days, 0.26 gram, or 4 grains; average daily quantity of chlorine in 3 days, 2·3 grams, or 35½ grains; approximate daily quantity of total urinary solids, 22¾ grams, or 350 grains; ratio of uric acid to urea, 1 to 31.

The next case, V, also resembles the foregoing. She was first seen during last May in the dispensary of the Episcopal Hospital. Since then she has been constantly under observation, for a time in the wards of the hospital.

Case V.—Miss R. L., aged 17 years, of delicate build; weight, 110 pounds. The symptoms of her ailment first noticed were that for the past two years there has been almost constant loin pain, with frequent spells of vertigo and headache. She was losing strength and was unable to attend to daily duties. There was anorexia and a feeling of weight in the epigastrium after meals, and constipation. When aged 6 years had had scarlatina, during the subsidence of which slight general dropsy occurred, lasting about a week.

Fig. 6.

R. L. Pressure, 2½ ounces; sitting.

When first seen she was of anæmic appearance. For a year or more she had not been getting the proper sort or amount of food because of the straightened circumstances of her people. An examination showed no cardiac hypertrophy. The first sound of the heart was distinct at the apex and the second was there accentuated. The pulse was rapid, and furnished the subjoined tracing (Fig. 6), one of several, all showing a similar condition of low tension and well-marked dicrotism with the aortic notch low.

Fig. 7. shows a tracing taken three weeks later, after a week spent in recumbency in hospital on soft diet (chicken once daily). In this tracing it will be noticed that

Fig. 7.

R. L. Pressure, 2 ounces; sitting.

tension is higher, the predicrotic as well as the dicrotic wave being quite well marked. Rest in bed and a more wholesome diet had evidently increased arterial tone.

During the two and a half months that she was under observation no drugs were given; a mild laxative was prescribed. An accurate record was kept of the daily quantity of urine for over one month. The average was 550 c. c. (18 fluid ounces). More or less loin pain, and spells of headache and vertigo continued throughout this time. These symptoms have since ameliorated somewhat under free purgation and large doses of potassium citrate, the last given to stimulate diuresis.

The urine in this case always deposited considerable mucoid sediment, and a reaction was obtained on three occasions to picric acid, and on two a slight cloud was evident on cooling after boiling a specimen slightly acidulated with acetic acid. This was evidently due to the presence of mucin, as a specimen subsequently treated

with excess of acetic acid, in the manner before described, gave them no trace of albumin response to any test.*

In three microscopic examinations casts were found on two occasions, once by Dr. Frank Massay, who kindly made an examination for me. Dr. Massay noted pale granular and hyaline cylinders of medium breadth, and cylindroids. In a later examination by myself, broad and narrow hyaline casts only, were seen. Calcium oxalate crystals were present in very large quantity in all examinations.

The figures in the accompanying table indicate that urea elimination in this case

Date.	Daily amount of urine in cubic centimeters.	Daily amount of urine in fluid ounces.	Specific gravity of mixed 24-hour specimen.	Color.	Daily elimination of urea in grams.	Daily elimination of urea in grains.	Daily elimination of urid acid in grams.	Daily elimination of chlorides calculated in grams. as Cl.	Daily amount urinary solids in grains.
1893.									
Apr. 30	400	13	1031	Reddish yellow.....	14·40	221	(a)	(a)	403
May 16	400	13	1029	....do.....	15	225	3	2·38	377
May 17	380	12⅞	1031	....do.....	10	154	(a)	2	395
June 11	440	14⅞	1031	....do.....	16·75	255	(a)	(a)	352
June 12	470	15⅞	1032	....do.....	22	338	(a)	(a)	500
June 13	480	16	1033	....do.....	18·25	280	(a)	(a)	528

Average daily amount of urine in the 6 days recorded above, 430 c. c., or 14 fluid ounces; average daily amount of urea in the 6 days, 16 grams, or 246 grains; approximate daily amount of total urinary solids in the 6 days, 27 grams or 421 grains.

a Not estimated.

is considerably diminished. The average daily amount for her weight should be about 350 grains, against the 246 noted. But one examination for uric acid was made. This (4½ grains) showed diminution. Chlorine elimination, too, as shown in the two examinations, is considerably below the normal, which would account for the ratio of urea to the daily amount of total solids being less than the usual one-half.

The next case is interesting in that, with few symptoms suggestive of chronic Bright's disease, renal degeneration in all probability exists. It was seen through the kindness of Dr. de Schweinitz, under whose care the patient was for failing vision. A renal ailment was not especially suspected by Dr. de Schweinitz, who had examined several specimens of urine for albumin with negative result. A cause for the symptoms—"chronic headache, with a curious form of optic neuritis in one eye and some degeneration in streaks in the other," as reported to me by Dr. de Schweinitz—not being apparent, he had sent the total twenty-four hours' urine to me for examination. On the urea being found somewhat diminished and casts being detected in the urine, I was permitted, through the courtesy of Dr. de Schweinitz, to see the patient on several occasions and to make further examinations of the urine.

Case VI.—Mrs. T., aged 51 years; widow; seamstress; weight 150 pounds. Had influenza two years ago. Following that has been subject to severe headaches, chiefly about vertex and frontal region. Has been subject to vertigo for a number of years. At times it is so severe that she has almost fallen with its occurrence when on the street. She has had more or less loin and sacral pain for some years, aggravated by being much on her feet. A tendency to constipation has always existed. No other symptoms are present save that eyesight began to fail unaccountably some months ago. That, lately, has improved under Dr. de Schweinitz's treatment. She never has passed large quantities of urine. Can not recall how long the small amount now voiding has been habitual.

A cardiac examination showed a strong first sound and a highly accentuated apical second sound. No enlargement was detectable. Apex beat was in normal situation. Pulse tension was high, but after radial was emptied by pressure, arterial wall scarcely distinguishable. Temporals not prominent. Considerable pressure necessary to develop tracing, but sphygmograms taken with from 2¾ ounces pressure up to 3¾ ounces similar; 4 ounces causes rounding of apex of upstroke. The accompanying

* This case has, of course, been under observation for too short a time, and too few examinations for albumin have been made to permit it, like Cases III and IV, to be more than suggestive. Albumin may only have been absent for a time in the course of the chronic malady from which she is undoubtedly suffering. It is, however, significant that with small amounts of urine, with the presence of casts, and symptoms indicating renal incompetency, albumin was at least then absent.

tracing, with which others, taken with the same degree of pressure, on this and other occasions are similar, is very significant, and by it alone a diagnosis of probable renal degeneration might be made. Though there is no history of lues, and

FIG. 8.

Mrs. T. Pressure, 3¾ ounces; sitting.

nothing to definitely indicate a present or past infection, Dr. de Schweinitz is inclined to regard the eye condition* as of specific origin, especially since improvement in this has been decided while on antiluetic treatment. However that may be, there is little doubt that an underlying kidney ailment is contributory to certain of the symptoms.

There were indications of albumin to picric acid in the first specimen of urine examined, acetic acid not being used to separate mucin. The urine was concentrated, and deposited, after a few hours' standing, a heavy cloud of mucus and oxalates, to the former of which the reaction may have been due. No response of any sort occurred with subsequent specimen. But 1 specimen was examined microscopically. Several hours' search of 5 slides revealed 3 typical granular casts, 1 long, very typical waxy cylinder and a number of pale, broad hyaline casts. There were also present small polyhedral nucleated granular cells, bladder and vaginal epithelium, a few leucocytes and red disks, and a profusion of calcium oxalate and uric acid crystals.

The urea elimination in this case is more diminished than is that of the preceding. The amount calculated for body-weight should be from 400 to 450 grains, while there is actually excreted but about one-half of this, or 230 grains. The total urinary solids excreted do not much exceed what the figure for urea should be were the renal tubular structure doing full work.

Date.	Daily amount of urine in cubic centimeters.	Daily amount of urine in fluid ounces.	Specific gravity of mixed 24-hour specimen.	Color.	Daily elimination of urea in grams.	Daily elimination of urea in grains. *a*	Daily elimination of uric acid in grams.	Daily elimination of chlorides calculated in grams as Cl.	Daily amount total urinary solids in grains.
1893.									
May 5	480	16	1031	Reddish yellow	16·80	258	(*b*)	(*b*)	496
May 10	553	18	1030	do	15	237	·57	5·50	540
May 11	490	16⅓	1030	do	14	215	·43	3·80	490
May 12	465	15½	1030	do	15	225	(*b*)	2·19	460
May 13	500	16⅔	1030	do	15	225	·50	(*b*)	500
May 14	470	15⅔	1032	do	14	215	·40	4·11	470

Average daily amount of urine, 500 c. c., or 16⅔ fluid ounces; average daily amount of urea, 15 grams, or 230 grains; average daily amount of uric acid, ·47⅓ gram, or 7⅓ grains; average daily amount of chlorine, 3·90 grams; approximate average daily amount of total solids, 32 grams, or 493 grains, ratio of uric acid to urea, 1 to 31½.

a The urea determinations in this case were kindly made for me by Dr. Leffmann.

b Not estimated.

In addition to the foregoing cases, through the courtesy of Dr. Charles A. Oliver I am able to report one, followed to its termination, in which albumin was evidently totally absent from the urine throughout the course of the disease. This case was originally sent to Dr. Oliver for an eye examination. No suspicions of renal trouble had been entertained until the fundal changes were noted.

* Dr. de Schweinitz's report is as follows:

Central vision, after the correction of an astigmatism, 6/6; field of vision for form normal, slightly contracted for colors. In the right eye iris somewhat sluggish to the reactions of light and shade; moderate optic neuritis, the apex of the swelling being 1 D. above the level of the surrounding eye-ground, the grayish swelling being chiefly confined to the disk; no hemorrhages or splotches. In the left eye, a vertically oval optic disk, gray in its deeper layers, the upper and lower edges hidden and the nasal edges veiled; a patch of atrophic retino-choroiditis up and out from the papilla, numerous glistening reflexes in the macula, and above the fovea some dark radiating streaks, apparently in the retina. Under the influence of iodide of potash and bichloride of mercury, in dose of 5 grains and one twenty-fourth of a grain, respectively, three times a day, the appearances of the eye-grounds steadily improved, and at the last visit, May 23, 1893, one month after instituting the treatment, the disk upon the right side was less swollen, the temporal edge being visible. The disk upon the left side had improved in appearance, but there was no change in the patch of choroiditis or in the macular lesions.

Dr. Oliver has furnished me the following note of this case:

Miss X., aged 19 years, an apparently strong and healthy girl of refinement and education, without any hereditary taint, was sent to the writer by her attending physician for recurrent frontal cephalalgia, associated with muscular and accommodative asthenopias. Careful examination of the fundus oculi showed the existence of a few faint flecks and dots in each macular region. So highly significant of renal disease were these changes that the medical adviser was warned as to their nature. Repeated chemical and microscopic examinations of samples of urine, voided at different hours of the day and under varying conditions, up to within one week of her death (the last examination), failed to reveal either to her physician, the writer (Dr. Oliver), and more competent authority, any albumen, tube casts, or other characteristic organic or mineral excreta—the specific gravity always remaining about normal. In spite of these negative results, low grades of neuro-retinitis, with and without fine spray-like hemorrhagic extravasations, came and went, until in about seven months after her eye-grounds were first studied, a uræmic attack suddenly appeared after exposure to cold, resulting in coma and death. Post-mortem examination revealed the presence of granular kidneys, with cardiac hypertrophy.

In reference to your inquiry as to the tests for albumin employed, I would state that, in every instance in which I examined the urine, the specimen was filtered and boiled, followed by the careful and slow addition of either nitric acid or acetic acid; this method was invariably followed by Heller's test, both by superimposing the urine upon the acid or allowing the acid to flow drop by drop beneath the urine along the incline test tube. In quite a number of instances I supplemented this by the application of heat, proving the presence of acid urates, which I afterward confirmed by the microscopic appearances of the ordinary six-sided rhombs. The specific gravity in some of these latter specimens, I remember, was somewhat high—1,024.

The specific gravity of the urine never fell below 1016, and 1024 was the highest.

Since beginning this investigation specimens of urine have been submitted to me from several cases of undoubted chronic Bright's disease in which the accompanying symptoms and the presence, in three, of so-called "albuminuric" retinitis had rendered the diagnosis very clear. In these, changes in the fundus were present in all, and considerable hesitancy had been felt by the medical attendants in accepting the opinion of the oculists as to the probable renal nature of the retinal condition because of the absence of albumin. In two of these cases albumin had been frequently examined for by heat and by nitric acid, over a long space of time, but never found; and casts had not been detected, save a single hyaline cylinder on one occasion in the urine of one of these. These examinations of the urine had not been made for some time when daily specimens of the twenty-four hours' urine were submitted to me. Examinations for urea and uric acid over some days, as in the preceding cases, were instituted, the result of which need not be detailed here. In one, a senile case, passing scanty, light-colored urine, of low gravity, out of 5 specimens of the mixed twenty-four hours' urine examined, response for albumin occurred twice; on one of these occasions to acetic acid and potassium ferrocyanide, and, slightly, to heat and acid—these two tests were then the only ones used. No casts could be detected in two examinations, no sediment being obtainable even with the employment of the centrifugal machine.

In the other case, under the care of the same physician, out of 8 specimens examined on different days, response to albumin occurred twice; on one occasion only to the more delicate tests, and on the other slightly also to heat. Epithelial and granular casts were found in the urine of this patient. Since these examinations the physician reports detecting albumin on a single occasion by nitric acid, and also by heat. Because of the even occasional presence of albumin in these cases I have not included them in my list. Both pass a diminished amount of urine, but are without dropsy. Slight uræmic symptoms are present. The arterial tension in both is habitually high. In one cardio-vascular changes are present. In the other, aged but 32, no arterio-sclerosis exists.

One other case of which I have notes, in which retinal changes occurred without albuminuria, is interesting, and may here be briefly referred to. This I recently saw through the courtesy of Dr. L. Wolff.

Symptoms of digestive disturbance had at first alone been complained of. For

these the patient, a woman aged 50 years, was treated by Dr. Wolff. Subsequently, when not under the doctor's care, her eyesight began to fail markedly. She then sought the eye dispensary of St. Agnes's Hospital for relief. The attendant there told her the trouble was renal, advising her to seek her physician, that her urine might be examined. Repeated search was then made by Dr. Wolff for albumin, without result. Examinations were then also made by the oculist, who was unable to understand the absence of albumin with such symptoms. It is needless to state that his search at the time of Dr. Wolff's examinations was also resultless. Later, Dr. Wolff lost sight of the case, but recently sought her out for my benefit. We found her suffering with pyelitis, which prevented the further study of the kidney condition from the point of view of absent albumin.*

As to the probable pathological nature of the kidney lesion in the preceding cases, the histories of which I have detailed, little more than conjecture is possible. Clinically, they form a series of various stages of a common ailment. Three of the 6 are young adults, and 3 in middle life. All present certain common symptoms which are referable to derangement of the renal functions, such as headache, vertigo, loin pain, high-tension pulse, diminution in the amount of urine, and in the most important of its constituents; the presence of casts, hyaline, granular, and waxy, and of isolated renal epithelia; the absence of albumin and of dropsy.

Detectable cardiac enlargement, hypertrophy, or dilatation, is absent in all, and thickening of vessel wall is recognizable in but one (Case III), although raised arterial tension, save on a strictly nonnitrogenous diet, is habitual in all save Case V.

It may be said that the assemblage of symptoms presented by these cases is typical of no distinct form of chronic nephritis, though their trend is suggestive of granular or cirrhotic kidney, or of the form described by Delafield† in his pathological classification of renal disease, as chronic diffuse nephritis without exudation.

The only form of chronic Bright's disease of which we have knowledge, in which the urine may be persistently albumin-free, is this or the red, granular, or cirrhotic kidney. Yet several, as regards age and absence of cardio vascular changes, and all as regards diminution in the amount of urine habitually passed, with coincident more or less marked diminution in elimination of urinary solids, and especially of urea, do not respond to the type of so-called fibroid kidney. But that fibroid changes are present in the kidney in all, accompanying whatever other alterations that may exist, there is probably little doubt.

As regards epithelial involvement, the absence of albumin, of dropsy, and of epithelial casts are against any extensive affection of the tubules; yet the presence in the urine in all of tubular epithelium, of granular, numerous hyaline, and, in one, of waxy casts, and the marked diminution of urinary solids indicate some involvement of these parts, though perhaps not as yet to a degree more than what may be termed *functional*.

Glomerular nephritis of pronounced type is quite impossible without albuminuria, yet glomerular changes, of the nature of thickening of capsules, of tufts and of vessels, are not improbable,‡ and may account for diminution in amount of urine, a symptom present in all, and especially in Case V., a young girl in whom scarlatinal dropsy occurred when aged six years, and in whom also, now, slight ephemeral disseminated œdema of the skin occasionally occurs.

Little further comment need now be made on these cases, the purpose of this paper not being subserved by mere speculation. It is not claimed for them that the urine is perpetually albumin-free, or that it will remain so to the end, as in Dr. Oliver's

*Dr. Wolff informs me, as this paper is going to press, that she recently died suddenly. No autopsy was obtained.

†American Journal Medical Sciences, October, 1891.

‡Mahomed believed that absent albumin, in certain cases of chronic Bright's disease, may be due to thickening of vessels of Malpighian tufts, through which it is difficult for albumin to transude; and also to thickening of the capsules of the tufts, preventing distention of vessels; and again, though less often in chronic Bright's disease than in acute, to protective contraction of the renal artery.

case. The present report is intended but as preliminary, to direct attention to a very similar class of cases of chronic Bright's disease apparently of not uncommon occurrence, in which, during the period of observation, albumin has been invariably absent to ordinary tests, and usually to those most refined—at a time, too, when marked indications of renal derangement have been evident.

Subsequently a further report on these cases will be made, with the addition of others that I may be able to encounter and study. My one object now, to which all other thoughts are subordinate, is to direct especial attention to this class of cases, the pathological classification of which will readily come when they obtain general recognition clinically.

The most important teaching of this paper, to which all should give heed, is that there is no doubt that but little stress can be laid on the mere absence of albumin from the urine in rejecting or confirming a diagnosis of chronic Bright's disease; that in any instance in which an examination for albumin is demanded as a part of an investigation to detect or exclude disease, no decided opinion dare be ventured as to the absence of the latter without further search of the urine, to determine not only the mere presence or absence of morphological kidney elements,* such as casts or epithelium, but also to discover the condition of the secretory renal function. As the latter can only be determined by an examination of a mixed twenty-four hours' specimen of urine, the total daily amount passed must be known. It should, therefore, be a rule, admitting of no deviation, in all cases of suspected Bright's disease in which albumin is undetectable in a single unmixed specimen, to obtain that of the total of one or, better, a consecutive series of twenty-four hours. Then, too, when albumin is absent in a single unmixed specimen, it may sometimes be discovered in that of the total twenty-four hours, when the more delicate tests are intelligently employed.

PSILOSIS (?) PIGMENTOSA.

By CUTHBERT BOWEN, M. A., M. D.,

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During the past four years I have seen so many cases of chronic diarrhœa—often ending fatally—in which a peculiar inflammation of the mucous membrane of the mouth is accompanied by a clearly-defined symmetrical pigmentation of the dorsal aspects of the hands and feet, that I have been forced to the conclusion that this triple association is not an accidental one, but is pathognomic of an epithelial disease *sui generis*, possibly peculiar to Barbados, or else closely allied to a specific disease of the alimentary canal which has its habitat in the East Indies, and has been accurately described by Dr. Thin, of London, as "psilosis linguæ et intestini."

The main features of this latter condition, as described by Dr. Thin, are "inflammation of the mucous membrane of the mouth and alimentary canal and chronic diarrhœa, portions of the tongue and the whole of the œsophagus being denuded of epithelium, and the entire mucous membrane of the ileum found in a shrunken, wasted, and sclerosed condition." The Dutch physicians of Java recognized the condition as possessing characteristics sufficiently unique to distinguish it from the ordinary chronic diarrhœas and dysenteries prevalent in tropical countries, and

* Nor should these be excluded until a search of sediment, obtained by the use of the centrifugal machine, is made. Notwithstanding it is accepted that the mere presence of hyaline and granular casts, though highly suggestive, is not pathognomonic of an actual coarse kidney lesion, their presence in the urine always indicates at least functional disturbance of the kidney; and when not due to alterations in blood-pressure (congestion and associated albuminuria), and when accompanied by the presence in the urine of renal epithelium, or when associated with symptoms of renal inadequacy and persistently raised blood-pressure, it may be safely asserted that chronic nephritis exists.

Fig.I. THE TONGUE IN "INDIAN SPRUE" (OR PSILOSIS) AS DESCRIBED BY Dr. THIN.

Fig. 2. THE TONGUE IN "PSILOSIS PIGMENTOSA" AS DESCRIBED BY Dr CUTHBERT BOWEN SHOWING INJECTED PAPILLÆ AND FOUR APHTHOUS SPOTS.

Sackett & Wilhelms Lith

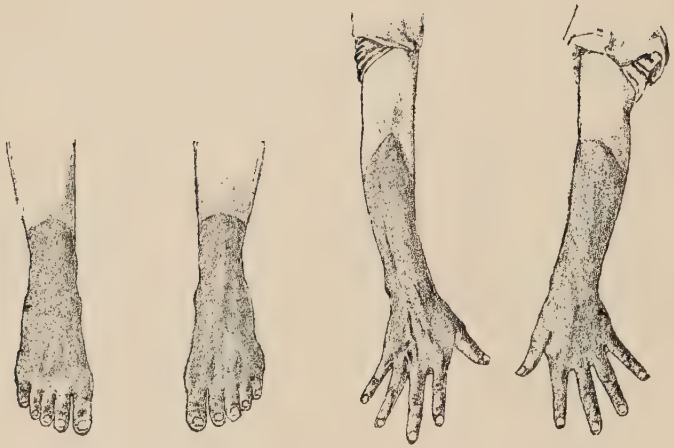

Fig. 3.—PIGMENTATION OF HANDS, ARMS, FEET, AND LEGS IN PSILOSIS PIGMENTOSOS.

gave it the name of "sprue," a term also employed in certain parts of Scotland to designate aphthous stomatitis.

Like many terms still in use, the word "sprue" carried with it no indication of the nature of the disease; and in order to emphasize the peeled condition of the mucous membrane of the alimentary canal always found in cases of "sprue," Dr. Thin suggested the adoption of the word *psilosis* instead.

This term, which is derived from the Greek *ψιλόω* (pluck, make bare, or strip), simply calls attention to the state of the tongue and mucous membrane, *i. e.*, that they are stripped or denuded of their epithelium, a symptom not confined to "sprue," but seen in cancer of the pyloric orifice, dysentery, and the final stages of exhausting intestinal maladies. Hence I take it that any condition in which the tongue and mucous membranes are found bare of epithelium may, without impropriety, so far as the etymology of the word is concerned, be spoken of as a *psilosis*. It is in this limited sense that I have ventured, in the absence of any etiological data from which to elaborate a more appropriate or original nomenclature, to borrow from Dr. Thin's vocabulary the term *psilosis* as a temporary heading under which to introduce the disease I am about to describe, it being distinctly understood that I do not believe that in Barbados we are dealing with the identical disease to which the term *psilosis*, in its technical adaptation by Dr. Thin, strictly speaking, belongs, although clinically there is a strong resemblance between their respective alimentary manifestations. The difference in the tongues is well shown in the drawing (fig. 1), and there appears to be no accompanying cutaneous pigmentation in Dr. Thin's psilosis. At any rate, the qualifying adjective "pigmentosa" will prevent confusion of the condition which forms the subject of this paper with the class of cases recognized as psilosis in the East Indies, and at the same time will call attention to one of the most prominent features of the former.

The external manifestations of *psilosis pigmentosa*, as we see it in Barbadoes, are a crimson peeled condition of the mucous membrane of the tongue and buccal cavity. The lips externally, as shown in the drawing (fig. 2), are bright red and especially vivid in black people. In mulattoes the contrast with the surrounding skin is less marked, while in the latter the pigmentation on the dorsum of the hands and feet is naturally more pronounced. The tongue, when protruded, assumes a long, narrow, pointed shape. Its papillæ are elevated, and aphthous ulcers are often, though not invariably, found on its lateral margins. Saliva constantly dribbles from the mouth, the patient filling cup after cup, both by day and night. This salivation, Dr. Thin tells me, does not occur in East Indian psilosis. Partly owing to the rawness of the mouth and partly to the constant accumulation of the saliva, speech is both painful and difficult, the secretion having to be swallowed or expectorated with every sentence. When the disease attacks the robust, the general appearance of the patient may be healthy, but in the latter stages the condition is one of extreme emaciation. The redness of the lips and tongue can be recognized from a considerable distance. In addition to these alimentary symptoms, the backs of the hands only in some cases, in others the dorsal aspects of the feet as well, are seen to have taken on a coal-black pigmentation. In light mulattoes it is more marked. It often assumes the form of a gauntlet. The pigmentation of the extremities, in the only two instances in which I have seen the disease in white persons, was of the hue which results from painting the skin with tincture of iodine. As will be seen on reference to the accompanying drawings, the pigmentation is very symmetrical, its limits being almost identical on the two sides of the body. It often extends no higher than the flexures of the wrists, but in the majority of cases reaches the level shown in the illustration (fig. 3). The symmetry of these lesions is most striking and highly suggestive of syphilis; and, indeed, in the first few cases which came under my notice, there was undoubtedly a syphilitic accompaniment.

Latterly, however, I have been able in several cases entirely to eliminate syphilis as an etiological factor. As regards the etiology of this curious disease I have at

present no suggestions to offer. The pathological process giving rise to the foregoing picture is by no means clear. Its clinical features are, however, unique, and will, I think, best be appreciated by a record of a few typical cases which I have selected out of some thirty which have presented themselves to my notice at the general hospital, Barbadoes. The features of the disease are unmistakable and constant. The only variation is in their severity.

On October 23, 1890, a black woman, Mary Lynch, aged 50, was admitted to the general hospital in what appeared to be the final stage of *psilosis pigmentosa*. Her family history was good. She had been the mother of ten children, eight of whom, at the time of her admission, were dead. The fourth and tenth child, aged 15 and 9 respectively, were alive and well. She had never had an abortion or premature labor. There was no history of rheumatism, alopecia, or sore throat. Her reputed husband had always been a very healthy man, and was at the time cohabiting with another woman, by whom he had several other healthy children. As far as I could gather from her statements, there had not been any syphilitic taint in any of the children. Still, the fact of eight out of ten being dead looked suspicious, and although I could detect in the mother no evidence of syphilis, I placed this case at the time in the category of "doubtful cases,"—*i. e.*, among a certain number in which I was unable absolutely to exclude syphilis as an etiological factor. According to her own account she had always been a healthy woman until two years previous to her admission, when she began to have dyspeptic symptoms,—*i. e.*, a sense of distention at the epigastrium, eructations of gas, and water-brash, the fluid eructated leaving a burning sensation in the pharynx and down the œsophagus. With this there has been an increased secretion of saliva and irregularity of the bowels. For some weeks there would be diarrhea and then spells of constipation.

Finally, there had been constant diarrhea, salivation, and loss of flesh. On her admission this woman's condition was most pitiable. She was terribly emaciated, worn almost to a shadow, the lips and entire mucus membrane of the mouth glazed and red. Confluent patches of aphthæ covered the tongue and lining mucous membrane of the mouth. The tongue was scarlet, perfectly raw, devoid of moisture, and, when she fell asleep, apt to adhere to the gums and roof of the mouth. Swallowing of the blandest materials caused most excruciating pain. She had constant diarrhea of a grayish, frothy character, the passages so numerous that no record could be kept of them, and so offensive that the patient had to be isolated. The backs of the hands, as far as the flexures of the wrists, were pigmented. With the gradual amelioration of the symptoms the pigmentation wore off, and when in six months' time she left the hospital, there were no traces of it to be seen.

The treatment in this case was purely empirical. Absolute milk diet, with flaxseed tea to moisten the tongue. Bismuth, pepsin, and opium, chlorate of potassium, turpentine, and nepenthe, and extract of coto, were all tried in various combinations, but without apparent success. Finally, on February 10, Kirby's mixture was tried, and coincidently with its administration there appeared to be a marked improvement. By March 12 she had so far recovered her digestive powers as to be able to assimilate raw chipped beef treated with hydrochloric acid, and on March 23 she was given the "full" diet of the hospital. The points worthy of note in this instance were the apparent amenability to dietary and therapeutic measures of a case in such an advanced stage, which is the more puzzling when the severity of the pathological lesions in the intestines in similar cases is considered. I have heard nothing of the woman since she left the hospital, but I can not believe her relief was more than temporary, and I suppose she will return to the hospital when the final outbreak of the disease comes on. From this case we also get a typical picture of the third stage of *psilosis pigmentosa*. Death invariably ends the scene in a short time. I have not since seen a case in that advanced stage recover.

October 10, 1891, a healthy looking mulatto woman, aged 54, came to the outpatient department of the general hospital, complaining merely of constant eruc-

tations of gas and salivation. She had been suffering for two months in this way, but had had no medicine. The salivation in cases of *psilosis pigmentosa* bears no resemblance to that caused by mercury, and is not likely to mislead any one. This woman's general condition, family history, and previous history were excellent, with one exception. She was a nurse, the daughter of two well-known, respectable married people, and had had thirteen brothers and sisters. All her brothers and sisters had been quite healthy. Both her parents had lived to extreme old age. Twenty years previous to my seeing her, the elder Dr. Manning had amputated her left breast. (Cancer?) With this exception, she had never had a day's illness. Her tongue was narrow and pointed, slightly glazed, and of the typical scarlet color. The lining of an ordinary red pill box is approximately the color of a *psilosis pigmentosa* tongue in the acute stage. Saliva was being constantly secreted so as to interrupt her conversation, and she complained of her intestines feeling "as though a pot was boiling inside them."

At first there was no diarrhea, but great irregularity in the movements. A fortnight before her admission she stated that her hands had turned black on the dorsal aspects, but at the time of her admission they were normal again. She stated that they had been black two months previous to that, and had similarly become normal by the blackened skin peeling off. This often occurs, and in the recurrent cases patients assure me they can always associate the acuteness of the diarrhea with the increased pigmentary deposit on the hands and feet. On her admission she was placed on a milk and arrowroot diet, and given a mixture of bismuth and *pulv. kino comp.*

This, however, failed to check the diarrhea entirely. Rectal injections of nitrate of silver were also tried, and by November 10 she had so far improved as to be able to eat broth diet, and by November 19 full diet with meat. On December 9 the diarrhea came on again, and from this time her progress was rapidly downward. No medication seemed to check the constant diarrhea, and she died of exhaustion on the 31st of December, *i. e.*, in eighty-two days from the time she presented herself in the out-patient department, complaining only of dyspeptic symptoms.

In the later stage of the disease the symptoms were identical with those of Mary Lynch, and need not be recapitulated. The lips fiery red, the tongue raw, adhering to the inflamed buccal cavity when not artificially moistened, and yet saliva constantly pouring from the mouth so as to fill many cups in a day; the body wasted to a shadow, and yet no physical signs to indicate trouble in any other organs than the intestines. At no time was there any vomiting, fever, or headache. In this case the post-mortem appearances, as in all the others, were in accord with the clinical features, and will be described later on, together with the microscopical appearances of the intestine, which are identical in all cases.

This woman had a history of possibly cancer of the breast, and in a great many of the cases which I have seen there has been great difficulty in eliminating syphilis, cancer, leprosy, tubercle, etc., as possible antecedent conditions. I will therefore omit the details of all but those in which I feel certain of the disease being purely idiopathic.

F. I., aged 23, was sent to me by Dr. Bannister, in April, 1892. He had been for some time under treatment for chronic irregular diarrhea. He was a healthy-looking young man and presented the typical signs of *psilosis pigmentosa—i. e.*, the backs of his hands to the elbows were pigmented and the tongue long, narrow, pointed, glazed, and scarlet. I made a note of his condition, and he returned to Dr. Bannister's care.

I then lost sight of him until August 1, when he was admitted to the hospital. He was placed on a milk diet, and given nitrate of silver and opium in pill form. By August 9 his diarrhea had so far improved that he was given middle diet, and a week later full diet. On September 13 he had diarrhea, and was put on milk diet exclusively. He was also given a mixture of bismuth, tincture of catechu, spirits of

chloroform, and infusion of krameria. On this he seemed to improve, and September 30 he could take small quantities of chicken tea. On September 30, as the diarrhea seemed to linger on, he was ordered injections per rectum of sulphate of copper (gr. v–3i) after each movement. By October 11 his diarrhea was better, apparently, and his diet was changed to rice, milk, chicken, bread, and English potatoes. From November 2, quinine and arsenic were given him as a tonic. November 19 he was given full diet, but two days later, as there were symptoms of diarrhea, he was placed on absolutely milk diet, and was kept on it until his death on February 17, 1893, the usual astringent drugs being tried in succession, but to no purpose.

At the time of his death he had been in the hospital seven months consecutively. I thus had an opportunity of watching a case of this curious disease from its inception in a healthy young man until its fatal issue in eleven months' time. The features of the disease in its later stages were identical with those recorded before. At the post-mortem, which I made the day following his death, I found the condition of the organs as follows: The lungs were pale, white, friable, and apparently free from any tuberculous infiltration. Microscopically, a slight catarrhal bronchitis was revealed, which during life had given evidence of its presence by a few moist râles, but otherwise the lung was perfectly healthy. There were no pleuritic adhesions on either side. The pericardium and heart were normal and all the valves competent. The liver appeared smaller than normal, but not to a greater extent than would be accounted for by the general wasting of the body. There were no signs of gummata about it. The spleen was somewhat softened, the œsophagus was reddened, apparently denuded of its epithelium, while the stomach was normal. The kidneys were unaltered. The intestines were very thin, white, and transparent looking, the small intestines at intervals of a few feet being puckered, as though they had been ligatured at these spots. This puckering corresponded to a circular ulceration on the inner side of the gut, which had destroyed the entire mucous membrane at the intervals indicated above. The remaining portion of the intestine between the sides of this annular ulceration was highly inflamed. The large intestine was a mass of ulceration, being spotted with tiny circular ulcers varying in size from a pin's head to a split pea. The ulceration was very intense in the rectum, but presented none of the characteristics of syphilis. Microscopically, the villi of the small intestine were found to be entirely devoid of their columnar epithelium. This is well shown in the drawing (Fig. 7). Towards the seat of the annular ulceration they diminished gradually in size. The ulcer itself extended only partly through the submucous tissue. The glandular structure of the intestine was entirely destroyed, its place being taken by a purely adenoid reticulum infiltrated with leucocytes. The circular muscular fibers gradually disappeared as they approached the annular ulcer, and were finally lost, the submucosa, greatly thinned, forming the floor of the ulcer. As tubercular ulceration often runs, as in these cases, transversely round the bowel, it may be as well to draw attention to the fact that the villi in tubercular ulceration are enlarged and infiltrated and the circular muscular fibres swollen and enlarged. The peritoneal coat also is thickened and vascular, a condition not observed in my case. Giant cells would of course be found in the submucosa, the tubercular nodules extending into the muscular coat.

Besides this, there are no indications of *psilosis pigmentosa* being clinically like tuberculosis.

While the pathological process underlying cases of *psilosis pigmentosa* is very evident under the microscope, the etiology of the disease is obscure. Neither age, sex, nor occupation can be considered as etiological factors. The earliest age at which I have seen the condition is three years, yet the pigmentation of the hands and the scarlet tongue were as well marked as in the adult. In the majority of cases, however, my patients have been adults. It occurs more often, I think, in women than in men, but I have not seen enough cases to speak positively on the subject. The disease is liable to intermissions, but may run its course without abatement in six or seven months.

FIG. 4.—THE INTESTINES IN PSILOSIS PIGMENTOSA. THE ILEUM AS SEEN FROM THE OUTSIDE.

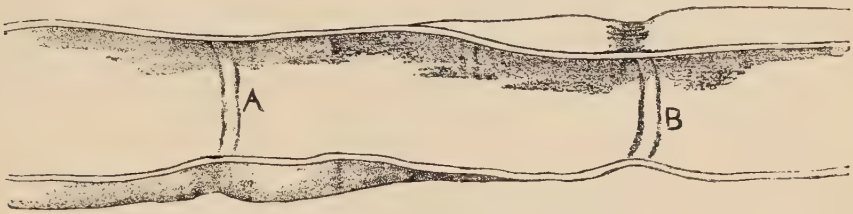

FIG. 5.—THE ILEUM AS SEEN FROM THE INSIDE.

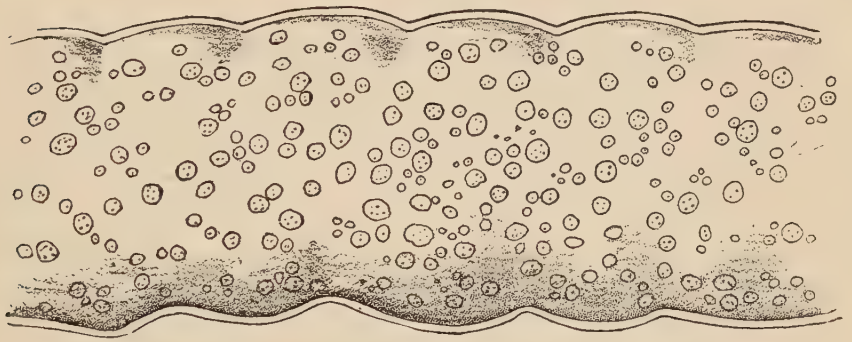

FIG. 6.—INTERIOR OF THE LARGE INTESTINE, SHOWING THE EXTENT OF THE PUNCTIFORM ULCERATION.

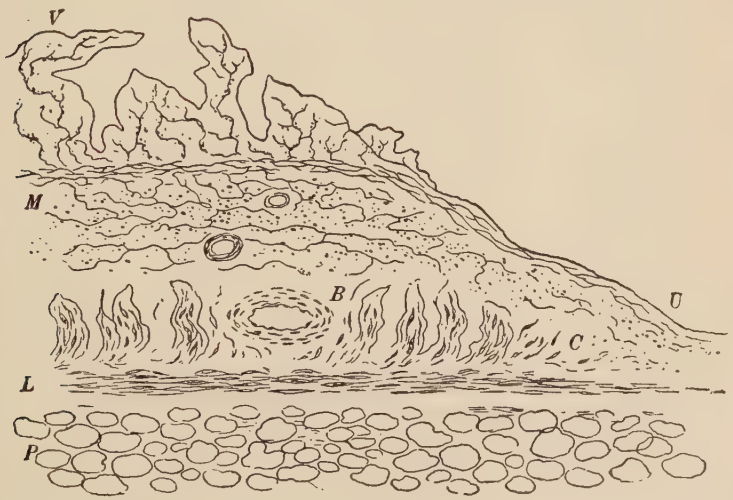

FIG. 7.—MICROSCOPICAL APPEARACE OF THE SMALL INTESTINES IN PSILOSIS PIGMENTOSA.

V, vili entirely denuded of ipithelium; *U*, site of annular ulceration, the vili entirely destroyed; *B*, blood vessel in circular muscular coat, showing thickening of wall; *C*, circular muscular coat, gradually disappearing; *L*, longitudinal muscular coat; *P*, peritoneal fat; *M*, submucosa with entire loss of gland structure.

In constitutions previously undermined by syphilis, leprosy, tuberculosis, or alcoholism, its course is more rapid.

Until further researches reveal the cause, treatment can only be palliative. In mild cases absolutely milk diet and intestinal astringents will at any rate not aggravate the disease. Nitrate of silver and opium by the mouth and rectal injections of the sulphate of copper seem to be indicated at times; but so far as my therapeutic knowledge goes we have no remedy capable of restoring the epithelium to an intestine *psilosed* to the extent shown in the drawings. As Dr. Thin aptly remarks to me in a private letter, "We are only now beginning to distinguish separate tropical intestinal affections which have been all roughly jumbled up together on account of diarrhœa, an abnormal tongue, digestive symptoms, and emaciation being common to all." In an association of medical men in which the tropics are largely represented, I trust much additional light may be thrown on this at present obscure condition.

THE CULTURE OF ANAEROBIC BACTERIA.

By FREDERICK G. NOVY, Sc. D., M. D.

Of the two classes of micro-organisms with which the bacteriologist has to deal, the aerobic bacteria have received the most, and the anaerobic bacteria the least attention. The introduction of liquid and of solid transparent media has enabled the culture of the former to be carried on with the greatest ease, and for that reason the vast majority of bacteria known at the present day and all those forms, with the exception of three or four, which are commonly cultivated in laboratories belong to the aerobic class. Systematic and thorough examinations are constantly being made of the bacteria found in water, air, soil, in disease and in fermentation, and yet as a rule such examinations are conducted wholly with reference to the presence of aerobic bacteria. It is true that most of the pathogenic bacteria known at the present day belong to this class, but it is likewise true that in the anaerobic class are to be found bacteria equally important.

The first known representative of this group was described by Pasteur in 1861 under the name of "vibrion butyrique" or "butyric acid vibrio." This discovery and the subsequent work carried on in this connection firmly established the existence of micro-organisms which were not only capable of living, but were actually compelled to live in the absence of oxygen. The next important step was made in 1878, when Pasteur, Joubert, and Chamberland described the first pathogenic anaerobic bacillus, the "vibrion septique" which at present is known to the scientific world through the labors of Koch and of Gaffky as the bacillus of malignant œdema. Since then two other pathogenic anaerobic bacteria have been described, namely, the bacillus of symptomatic anthrax by Arloing, Cornevin, and Thomas (1880) and the bacillus of tetanus by Nicolaier (1885).

As already stated, most of the bacteriological work carried on hitherto has been with aerobic bacteria, and as a result, the known representatives of this class may be numbered by hundreds, while, on the other hand, the much neglected group of anaerobes scarcely includes a dozen. It must not be imagined for a moment that this great difference actually represents the relative numerical existence of the representatives of these two classes, for such is not the case. There is every reason to believe that the number of pathogenic and nonpathogenic obligative anaerobic bacteria is much greater than is commonly supposed.

The explanation for this marked difference must therefore be sought elsewhere. It may be said that the chief reason lies in the ease and convenience with which aerobic bacteria can be cultivated, whereas the culture of anaerobic bacteria is tedious and difficult and requires special apparatus. Suitable apparatus and suitable culture media, especially the latter, are prime requisites in growing anaerobic

bacteria. Numerous methods and different kinds of apparatus have been at various times described, and while some of these are good yet most of them, it must be confessed, are far from being satisfactory.

The methods of anaerobic culture can be described under the following heads: (1) Exclusion of oxygen; (2) exhaustion of air; (3) absorption of oxygen; (4) displacement of air; (5) cultures in the presence of air.

I. EXCLUSION OF OXYGEN.

The methods that have been described under this head attempt to exclude or prevent access of oxygen to the culture medium. This object can be accomplished, to a greater or less extent, by the following methods:

(*1*) *Layer of oil.*—Pasteur, as early as 1861, resorted to the covering of culture medium with a layer of oil, and this method was subsequently used by others and tested by Liborius. Approximately anaerobic conditions can thus be obtained, but the method is not one that can commend itself for neatness or exactness.

(*2*) *Mica plates.*—In 1884 Koch suggested covering ordinary gelatin plates with a thin film of mica, but this was shown by Liborius to possess little or no merit when applied to the culture of obligative anaerobic bacteria. More recently Sanfelice has employed, with good results, a modification of this method. Gelatin or agar plates are made as usual and then covered with a sterilized glass plate. The colonies which thus develop can be readily examined under the microscope and are accessible for transplantation.

(*3*) *Deep layer culture.*—This method, so commonly and successfully employed at the present day, was introduced by Hesse (1885) and later was more extensively applied by Liborius. It is exceedingly convenient and enables one to obtain stick cultures or isolated colonies in gelatin or in agar. All that is necessary is to employ a deep layer of the nutrient medium 4 to 6 cm. high. Growth takes place in the lower part of the tube since access of oxygen is prevented by the upper layer of the medium. Very often an extra layer of agar or gelatin is poured upon the surface of the inoculated medium, but this, as a rule, is unnecessary. Colonies may be obtained by inoculating the culture medium while liquid, and then, after solidification, covering the contents of the tube with an extra layer of gelatin or agar. The latter addition, however, is not necessary, since growth occurs without it, beginning at about 1 cm. below the surface of the medium. The colonies are usually reached, for purposes of transplantation, by breaking the tubes. The procedure of Sanfelice is undoubtedly preferable. In this the bottom of the agar tube is warmed and the agar cylinder is then shaken out upon a sterilized plate or dish, where it is cut up into parallel disks or sections. The colonies can then be examined under the microscope and transplantations made in the usual manner.

Liborius, in his work on the anaerobic bacteria, made plate cultures in the usual manner and then covered these with an extra layer, 1.5 cm. deep, of agar. In this way he succeeded in obtaining colonies of malignant œdema, which he failed to obtain with ordinary plates in hydrogen.

The roll-culture method has also been recommended by Esmarch for obtaining colonies of anaerobic bacteria. For this purpose the gelatin or agar is inoculated and dilution made, as usual. The medium is then caused to solidify on the inside of the tube in a thin layer, and while cold the tube is filled with liquid gelatin or agar.

The principle of deep-layer culture was applied in 1887 by Vignal to the so-called glass-tube culture. A tube about 1 m. in length is drawn out at one end and plugged with cotton at the other. When sterilized it is inserted into the inoculated gelatin or agar, and by suction this is now drawn up into the tube. When full, both ends are sealed and the tube is set aside to solidify and develop. Isolated colonies in this way are readily obtained and can be reached by cutting the tube. This procedure of Vignal has virtually been redescribed in 1890 by Van Senus, who employed a tube bent in U-form so as to siphon off the inoculated liquid gelatin from the test tube.

The Roux pipette cultures, where special pipettes are filled with inoculated gelatin and then sealed at both ends, may also be spoken of as modified glass-tube cultures. Capillary tubes have similarly been used by Klebs and by Salomonsen and more recently by Nikiforoff.

Another modification of the deep-layer culture is to exclude the oxygen, not by an extra layer of the culture medium, but by growing on the surface of the agar or gelatine some germ which has marked avidity for oxygen. With this object in view Roux (1887) recommended the bacillus subtilis. The proteus vulgaris has been employed for a similar purpose by Liborius (1886).

Under this same head may be mentioned the egg-culture of Hueppe (1888) and the deep potato cultures of Gaffky (1881), by which he cultivated the bacillus of malignant œdema.

II. EXHAUSTION OF AIR.

It would almost naturally suggest itself to obviate the deleterious action which the oxygen of the air exerts on the growth of anaerobic bacteria by exhausting the air from the culture tube or apparatus by means of a suitable air pump.

(1.) Direct vacuum cultures.—The principle of vacuum culture was applied by Pasteur, Joubert, and Chamberland in their study of the "vibrion septique." These investigators employed a special and complicated form of glass apparatus consisting of a U tube, with sealed ends and with lateral attachments. The convex portion of the tube is connected with a glass tube which is sealed as soon as a vacuum is made.

The method of Gruber (1887) is commonly employed at present for obtaining vacuum cultures. Special large-sized test tubes, with constricted necks, are employed. When inoculated the tube is connected with an air pump, or an aspirator and is finally sealed in the flame of a Bunsen burner or blast lamp. A somewhat similar vacuum tube, provided with a side tube connection, has been employed in the same way by Roux (1887). An excellent advantage of this method lies in the fact that it can be utilized in obtaining colonies. For this purpose the tubes as soon as sealed, may be converted into Esmarch roll cultures.

To obtain colonies in a vacuum, Roux recommended the use of a large tube, with constricted neck, which is evacuated, then sealed, and placed on its side to develop.

The apparatus described by Klebs is adapted to show the effect of partial vacuum (or compression) and consists of a tabulated bell-jar inverted over mercury.

(2.) Instead of producing a vacuum direct by exhaustion some investigators have resorted to the expulsion of air by aqueous vapor. The special tube or flask contains the nutrient medium which is boiled until all the air is expelled by the aqueous vapor, then sealed, and when cool the medium is inoculated from a side tube attachment. Such apparatus has been employed by Pasteur, Hüfner. Rosenbach, Liborius, and Aitken. This process, however, may be said to be obsolete at the present day, inasmuch as any desirable vacuum can be readily obtained with a pump without concentrating the culture fluid to such a marked extent as is usually done in this method.

III. ABSORPTION OF OXYGEN.

All methods based upon this principle utilize the fact that an alkaline solution of pyrogallic acid absorbs oxygen with avidity. This method was first employed by Nencki, in 1880, to demonstrate the existence of anaerobic organisms. A practical application, however, was not made until 1888, when H. Buchner devised the method which bears his name. The culture tube is placed inside of a larger one, in the bottom of which is an alkaline solution of pyrogallic acid, and the outer tube is then closed with a rubber stopper. As can be readily seen, this method is exceedingly simple and can be resorted to at any time. Babes and Puscariu have employed the same method with excellent results for serial cultures of the bacillus of tetanus. For this purpose the tubes were placed in a Fresenius desiccator, in the bottom of which was a large quantity of alkaline pyrogallate solution.

Trambusti (1892) has constructed a special apparatus for obtaining plate cultures of anaerobic germs by means of this solution. The principle has also been applied in two different ways in making hanging-drop examinations of anaerobic bacteria. Thus, Braatz (1890) designed a special slide made by Desaga, of Heidelberg, whereas Nikiporoff (1890) employed the ordinary concave slide, or that of Schultze.

IV. DISPLACEMENT OF AIR.

This can be readily accomplished by passing through the culture apparatus a current of indifferent gas. Hydrogen is commonly used for this purpose, inasmuch as it is ordinarily held to be an inert gas. There seems to be considerable reason to believe, however, that hydrogen is not absolutely inert, inasmuch as it is a matter of frequent experience to find cultures fail of development where hydrogen has perfect access, as in plates, Esmarch roll tubes, and surface streaks on agar. Nevertheless, it may be truly said that hydrogen is the best gas that we have at present for anaerobic culture.

Carbonic acid has been used a great deal by the French bacteriologists. It is not, however, an indifferent gas, inasmuch as when absorbed by the culture medium it may render it acid and thus prevent growth. Frænkel showed, in 1889, that symptomatic anthrax bacillus in bouillon, and malignant œdema bacillus in bouillon and gelatin, failed to develop in carbonic acid, and the experiments of Frankland (1889) also seem to show that carbonic acid not only inhibits the growth, but may even kill bacteria. Kitasato likewise failed to obtain growths of symptomatic anthrax in carbonic acid, although the French investigators of this disease employed this gas almost exclusively. Pasteur, Joubert, and Chamberland employed carbonic acid in cultivating their "vibrion septique," but Gaffky succeeded but once in obtaining cultures of the germ in this gas.

The failure to obtain cultures in carbonic acid has led to its practical disuse for anaerobic work. The difficulty, however, does not lie so much in the deleterious action of this gas as it does in the quality and reaction of the culture medium. As already stated, the culture medium must be given the first attention, as it is the most important condition for the growth of anaërobic bacteria. By using fresh or reheated bouillon, especially 2 per cent gelatin bouillon, or ordinary glucose gelatin having a suitable degree of alkalinity, no difficulty has been experienced in cultivating the bacilli of tetanus, malignant œdema, symptomatic anthrax, and a new anaerobic bacillus, the "bacillus œdematis maligni No. II," which will be separately described. Not only that, but cultures of the latter bacillus and of tetanus have been kept in carbonic acid for a month without losing their vitality.

Nitrogen has also been recommended as an inert gas, and possibly it may prove to be best adapted for anaerobic work. It has not been used to any extent, chiefly owing to the difficulty of obtaining the gas in quantity. In the absorption methods already described the residuary gas is nitrogen, containing small amounts of carbon monoxide.

Other gases, as carbon monoxide, hydrogen sulphide, nitrous and nitric oxides, and sulphurous acids have been studied by Frankland. All these are said to either inhibit the growth of bacteria or actually destroy them and are, therefore, not utilizable.

Illuminating gas has been highly recommended as a convenient means of displacing air from culture tubes and flasks by Wurtz and Foureur (1889). Kladakis subsequently tested the action of illuminating gas on a large number of aerobic bacteria, and also on the tetanus bacillus, and found that with the exception of "proteus vulgaris" the growth was inhibited, and that in some cases the micro-organisms were actually destroyed. For this reason he condemned the use of this gas for anaerobic culture. The conclusion arrived at is not strictly correct, inasmuch as he tested the action of the gas on Esmarch roll tubes made after Fraenkel's method. It is a fact that similar roll-cultures, and even plates often fail in hydrogen, and yet this gas is

usually held to be inert and is highly recommended for anaërobic-culture. Furthermore, it should be borne in mind that the composition of the gas in different localities may vary considerably and that, therefore, the gas of one locality may be suitable for culture, whereas that of another place may be wholly unfit.

With a suitable culture medium it is not at all unlikely but that cultures of the anaerobic bacteria can thus be readily made. What has been said in connection with carbonic acid is equally true here, and cultures in illuminating gas have been obtained of the tetanus bacillus and the new bacillus mentioned. Such cultures preserve their vitality in that gas for a considerable length of time.

Having thus somewhat briefly considered the various gases which may be used to effect displacement of air, it is desirable to touch upon the various forms of apparatus which have been recommended for use in this connection.

The complex U-shaped apparatus of Pasteur, already mentioned as employed for vacuum cultures, has also been utilized for cultivating anaërobic germs in atmospheres of carbonic acid and hydrogen. The apparatus, however, is far from being satisfactory for general work and is scarcely employed at the present time.

The first attempt at approximating the ordinary tube-culture was made in 1885, by Hauser, who employed test tubes with two lateral tubes through which a current of gas could be passed after which the tubes were sealed. This tube has been improved upon by Liborius, and with this well-known modification anaerobic-cultures can be readily made. As a convenient substitute for the Liborius tube, which may not always be on hand, Roux (1887) recommended an ordinary test tube somewhat constricted below the neck by means of a lamp. Through the cotton plug a sterile capillary tube is inserted and through this hydrogen is passed until all the air is expelled. The delivery tube is then carefully withdrawn and the culture tube sealed in a flame. This same modification has been practically redescribed by Heim and by Ogata (1892).

In the method of Liborius, or its modification, as just given, one serious disadvantage is encountered. The tubes can be employed but once, and this at times—as where a large number of cultures are to be made—may be a source of considerable expense. To obviate this difficulty and to combine the advantanges of the Liborius tube with that of Gruber, led Fraenkel (1888) to introduce a simple and excellent method. He employed ordinary wide test tubes which are closed with a double perforated stopper, through which pass two glass tubes, one of which extends almost to the bottom, and the other reaches just below the stopper. This culture tube, when filled with nutrient gelatin or agar, is sterilized, then inoculated and a current of hydrogen passed through the tube. When all the air is expelled the glass tubes are sealed and the stopper covered well with hard paraffin. In this way cultures can be readily prepared at a trifling expense. A further advantage of this method lies in the fact that the tubes can be used, if desirable, for Esmarch roll-culture, and moreover the growth is always readily accessible.

Sternberg has slightly modified the Fraenkel method in this way. The cotton of the inoculated tube is cut off, then pushed down into the tube and the rubber stopper with two glass tubes is inserted and hydrogen passed into the tube. The glass tubes are finally sealed and the cultures set aside to develop. Essentially the same process as that of Fraenkel was employed about the same time by Brieger and by Hueppe for flask cultures.

The tube-cultures just described are ordinarily employed for bouillon or gelatin cultures. For surface growths on agar or blood serum the method of Fuchs or any of its modifications may be utilized. According to Fuchs (1890) the agar or blood-serum tube is inverted and a current of hydrogen passed in for one-half to one minute. The tube is then rapidly closed with a sterilized rubber stopper, which is rendered perfectly tight by means of paraffin, and set aside in an inverted position to develop. Van Semes (1890) modified this method by first constricting the neck of the tube, and then, after passing hydrogen through a capillary tube inserted

through the cotton plug, the culture tube is sealed in a flame. This procedure it will be seen is virtually the same as that employed by Roux, Ogata and Heim. Blücher (1890) inverted the inoculated tubes over dilute glycerin and then passed in hydrogen, whilst still more recently Hesse has advised the use of mercury. The culture tube is inverted over a crucible containing mercury, placed on the bottom of a narrow tall beaker, and hydrogen is passed into the tube until all the air is displaced.

The principle of displacement of air has also been utilized for obtaining colonies of anaërobic bacteria by the usual plate method. Liborius in 1886 employed ordinary glass plates or Petri dishes which were placed on a rubber base and covered with a flat strong cylinder provided with two tubulures through which hydrogen could be passed. The apparatus was rendered gas-tight by compressing the glass jar against the rubber base by means of thumbscrews. Blücher (1890) recommended a simple and easily constructed apparatus consisting virtually of a funnel inverted over a glass dish containing dilute glycerin. Hydrogen is passed through the funnel and the air is forced out at the bottom. A more convenient apparatus is that of Botkin (1890). In this apparatus as many as six Petri dishes can be placed at the same time. Air is excluded by means of liquid paraffin. Hesse has suggested the inversion of a bell jar over mercury contained in a circular trough on a cast-iron plate.

Kitasato in connection with his study of the bacillus of tetanus employed a somewhat peculiar apparatus for plate purposes. This is flat and flask-shaped with the rather wide neck turned upwards. On the upper surface near the farther end is a narrow glass tube which serves to connect with the next dish. These dishes of Kitasato are sterilized and the gelatin or agar, previously inoculated, is then poured in and allowed to solidify on the bottom in the same manner as in a Petri dish. They are now connected together and hydrogen is passed through. When all the air is displaced the ends of each flask are securely clamped, sealed with paraffin, and the flasks are then set aside to develop. A modification of Kitasato's dish has been recently (1893) described by Roth.

The tube recommended by Roux for obtaining plate-cultures in a vacuum may also be employed in connection with hydrogen or other gases. The gas may be introduced by means of a capillary glass tube inserted through the cotton plug, and when the air is expelled this tube can be carefully withdrawn and the neck of the flask sealed in a flame.

Special single plate dishes for anaërobic-culture have been devised by Gabritschewsky (1891), Kamen (1892), and by Ahrens.

It is perhaps well to repeat in this connection that the tubes of Liborius or of Fraenkel can be treated as Esmrach roll tubes and in this way anaërobic colonies can be secured.

V. CULTURES IN THE PRESENCE OF AIR.

All the methods thus far described are more or less complicated, and the ideal method for the growth of anaerobic bacteria would be the one which would do away entirely with special apparatus and in which the growth would take place under conditions similar to those employed in connection with the culture of aerobic bacteria. With such an object in view Kitasato and Weyl studied the action of a large number of reducing and oxidizing chemical compounds in the hope of finding some substance which would enable anaërobic bacteria to grow under ordinary conditions. Although they were unsuccessful in their search they have nevertheless shown that certain reducing compounds, as sodium formate, sodium indigo sulphate, resorcin, etc., can be used to advantage in cultivating anaerobic bacteria.

Penzo (1891) has succeeded in obtaining growth of anaerobic bacteria in air by imitating the conditions which undoubtedly exist in nature. He showed that tubes inoculated with the bacillus of malignant œdema would develop in the air if inoculated at the same time with an aerobic germ as the micrococcus prodigiosus

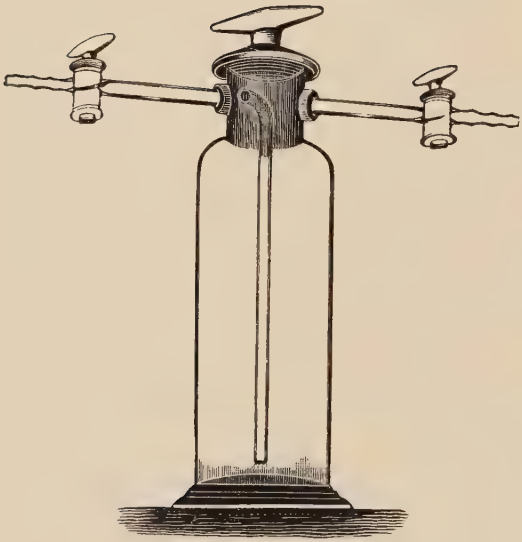

FIG. 1.—One-fourth natural size.

or the proteus vulgaris. The cultures thus obtained are highly virulent, but are impure.

On first consideration it would seem to be impossible to obtain pure cultures of anaerobic bacteria in liquid media in the presence of air. Nevertheless this can be accomplished by paying special attention to the culture medium. Thus ordinary glucose gelatin, especially when colored with litmus, readily furnishes cultures, at a temperature of 37–39° C., of the 4 anaërobic bacteria already referred to. Similar results have been obtained with a fresh 2 per cent gelatin glucose bouillon. Furthermore an interesting fact bearing on this point may be mentioned. In freshly solidified glucose agar a drop or two of water of condensation usually accumulates on the surface and if stick cultures are made in such tubes growth takes place not only along the stick but the surface liquid becomes turbid, gas bubbles form and on examination it will be found to swarm with actively growing anaerobic bacilli. This has been observed thus far with the bacillus of malignant œdema, the bacillus of symptomatic anthrax, and the "bacillus œdematis maligni No. II."

Of the methods thus briefly described only a small number have met with favor among bacteriologists. The methods, more or less, in general use are: The deep layer culture of Hesse and Liborius. The vacuum tube cultures of Gruber. The hydrogen cultures in Liborius or Fraenkel tubes, or in Botkin's apparatus. The alkaline pyrogallate method of Büchner.

For occasional single cultures either of these methods give excellent results. On the other hand there are times, as in the extended study of a given anaerobic germ, when it is desirable to make a large number of cultures, very often in sets. In such cases the insufficiency of the above methods soon becomes apparent. Thus, the vacuum tubes of Gruber and the hydrogen tubes of Liborius possess the disadvantage that they can be used but once, and therefore where a large number of cultures are to be made the expense becomes considerable. The matter of expense so far as hydrogen tubes are concerned has been reduced to a minimum by Fraenkel's modification, but even this, convenient as it may appear, has at times serious drawbacks. Thus the tubes require sealing in a flame, and while this operation is simple and easy it becomes very tedious and is not without danger when a large number of cultures are to be made. Furthermore sets of cultures made in this way are not strictly comparable, one with another, inasmuch as there is no positive uniformity in the series. The pressure of hydrogen in the different tubes may vary; the air may be more or less incompletely displaced, or a leakage may result without being noticeable. Similar objections may be likewise brought up against the vacuum tubes of Gruber. Moreover the operation of sealing tubes, whether with a vacuum or with hydrogen, is not one which commends itself for general and extended use.

These objections to the methods commonly in use were forcibly felt in connection with the study of the new pathogenic anaerobic bacillus, the bacillus œdematis maligni No. II. The attempt was therefore made to devise or construct some simple apparatus which could be used for vacuum or for hydrogen cultures and which would permit the use of the ordinary 12 or 15 cm. test tubes and would not require sealing in a flame.

The following apparatus has satisfied all requirements in that direction. It has been in constant use during the past year, and with it many hundreds of cultures of various anaerobic germs, including the bacilli of tetanus, malignant œdema, and symptomatic anthrax, have been made either in vacuum, hydrogen, carbonic acid, or other gases.

This apparatus was made for me by Greiner & Friedrichs, of Stützerbach, i. Thüringen, and is constructed on the principle of the well-known gas wash bottle of these makers. The glass stopper is hollow and opens below, and on opposite sides are two openings into one of which is fused a glass tube which extends down to the bottom of the bottle. Into the neck of the bottle are fused two glass tubes, the openings of which correspond to the openings in the stopper. All that is therefore necessary to seal this bottle is to turn the stopper at an angle of 90°.

Not only can this apparatus be employed for culture with various gasses, but it can likewise be used for vacuum cultures. In that case it is desirable to attach either by fusion or by strong rubber tubing, a glass stopcock to each arm. Screw clamps can, of course, be also employed, but are less desirable. This is necessary, since when a vacuum is produced within the bottle it is almost impossible to turn the stopper. The accompanying fig. 1 represents a bottle of this kind.

The method of using this apparatus is briefly as follows: Ordinary culture tubes (12 or 15 cm. in length) are inoculated. The cotton plugs are cut off close to the tubes and are then raised slightly so as to be perfectly loose and thus aid diffusion. The tubes are placed by means of a pair of long forceps in the bottle, the bottom of which it is best to cover with a layer of cotton. In this way it is possible to make as many as 40 or 50 cultures, side by side, and under exactly the same conditions. The stopper is then introduced, care being taken that the openings in the stopper correspond with the openings of the tubes in the neck of the bottle, and the apparatus is connected with a Chapman aspirator or other form of air pump. A vacuum, sufficient for all purposes, can be readily obtained. Thus a partial vacuum of 600 to 650 mm. readily grows such well-known anaërobic germs as those of tetanus malignant œdema and symptomatic anthrax.

Instead of producing a vacuum in the culture bottle the air present may be displaced by hydrogen, or any other gas that it is desirable to experiment with. It is best to allow hydrogen to enter at the top and to leave the bottle at the bottom through the long tube. With carbonic acid the reverse is done; it is passed through the long tube to the bottom and leaves the bottle at the top. The exit tube is connected with a small wash bottle containing water which serves as a valve to prevent the entrance of air into the bottle. The gas is rapidly passed through for one to two hours. The stopper is then turned at right angles, and the bottle disconnected and set aside to develop.

The displacement is accomplished more rapidly by first creating a vacuum in the bottle and then admitting the hydrogen, or whatever gas is used, through one of the lateral stopcocks. When the bottle has become filled with gas it may be reevacuated and hydrogen again admitted. By repeating this once or twice and then passing a steady current of the gas for about a half an hour perfect displacement is obtained. When working with a vacuum the stopper should not be turned so as to seal the bottle, inasmuch as it then would almost be impossible to open it. The lateral stopcocks or screw clamps must be used instead to hold the vacuum.

Not only can such a bottle be employed for either vacuum or gas cultures, but it can and has been used to obtain cultures by the absorption method. For this purpose the inoculated tubes are placed within the bottle on the bottom of which is a strong solution of sodium or potassium hydrate. The stopper is inserted and a concentrated solution of pyrogallic acid is aspirated into the bottle through the glass side tube which connects with the inner tube that extends to the bottom. The glass stopper is then turned and the bottle is ready to be set aside for development.

The above apparatus can be obtained of Greiner & Friedrichs (or through Messrs. Eimer & Amend, of New York) in two sizes. The stoppers have a diameter of 4 cm. No. 1 has an internal diameter of 10 cm. and the height of the bottle to the neck is 20 cm. It is intended for the large 15 cm. culture tubes. No. 2 has an internal diameter of 8 cm. and the height of the bottle to the neck is 15 cm. It is intended for the small (12·5) test tubes. Either size can also be obtained with glass stopcocks already fused into the lateral tubes. The price of the bottle without lateral stopcocks is about 6 marks, and with stopcocks, about 10 marks.

A convenient substitute for the apparatus just described can be constructed by any one in a very short time and at little expense. A strong wide-mouth bottle is selected which has an internal diameter of about 9 cm. The height to the neck is about 15 cm. The mouth of the bottle should be about 5 cm. wide and is closed with a double perforated rubber stopper. It is desirable, especially when it is to be used

FIG. 2.—One-fourth natural size.

for vacuum purposes, that the sides of this stopper slant at a considerable angle in order to prevent the forcing of the stopper into the bottle by atmospheric pressure. The stopper for the above bottle has a lower diameter of 5 cm. and an upper diameter of 5.7 cm.

Two glass tubes with glass stopcocks are now selected and one arm of each is bent at right angles and inserted into the stopper. Below the stoppper one of these tubes is connected by means of a piece of rubber tubing with a glass tube which nearly reaches to the bottom of the bottle. The end of the other tube terminates on a level with the lower surface of the stopper. Such an apparatus is represented in fig. 2.

With this simple apparatus cultures can be made in the same manner as with the previously described bottle. The anaërobic pathogenic bacteria already mentioned can thus be readily grown in vacuum, or in hydrogen or other gases. The alkaline pyrogallate method can be used in the same way as that given in connection with the former bottle.

The glass stopcocks will hold a vacuum perfectly if covered well with vaseline. As a matter of precaution it is desirable to seal the rubber stopper with paraffin having a high melting point, 46 to 56° C.

The commendable features of the apparatus in either form may be summarized as follows: (1) It is cheap, clean, simple, and effective. (2) It is adapted for culture with alkaline pyrogallate solution, or in vacuum, or with any desirable gas. (3) It does not require special culture tubes—ordinary test tubes are used. (4) It permits parallel cultures to be made, even in large numbers, and all under exactly the same conditions. (5) It can be used for bouillon or gelatin cultures; for stich cultures; for streak cultures on agar, blood serum, or potato, and also for esmarch roll cultures. (6) It requires no sealing in a flame.

Colonies of anaerobic bacteria unless on plates or in Petri dishes are very difficult to study and to photograph. As plate cultures very often fail for some unexplainable reason, the following method has been used to obtain colonies: The flat bottles or dishes (6 cm. in diameter and about 0·8 cm. in thickness) as recommended by Král for making permanent bacteriological collections of colonies are filled about two-thirds full with the nutrient medium, sterilized and then inoculated with the germ and set aside to develop. Owing to the flat, shallow form of the dish, it can now be placed on the stage of the microscope, and the colonies can be examined with as much ease as on a plate. Unfortunately the colonies in these flat-dish cultures are not accessible for transplantation.

Culture media.—The essential requirement to success in the culture of anaërobic bacteria lies in a suitable nutrient medium. In general terms it may be said that a slightly alkaline medium is best adapted for this purpose. Exceptions to this statement will be found among the anaerobic in the same way as such exist in the aerobic bacteria. The bacillus of symptomatic anthrax, for instance, is best grown according to Kitasato on slightly acid media. It can, however, grow on distinctly alkaline media, although perhaps less abundantly.

The anaerobic bacteria readily grow in strongly alkaline bouillon, but the vitality of such cultures is rapidly lowered and finally they die out completely. Some times death results within two days after the inoculation and that in spite of the fact that the growth at first was excellent This was especially the case with "Bacillus œdematis maligni, No. II."

Great stress is also frequently placed upon the use of perfectly fresh culture media. There can be no doubt but that fresh bouillon or agar is better adapted than old material for the growth of these organisms. Thus it is frequently observed in working with a given set of bouillon tubes that in the course of a week after they are made and often in less time the cultures develop more slowly and less abundantly than when the material was fresh. This difference in growth can be demonstrated by making parallel cultures in old bouillon and in the same after heating it in the steam sterilizer for about a half an hour. The set of heated bouil-

lon tubes will show a much more abundant growth and more gas formation than the cultures in the old unheated bouillon.

It is therefore desirable, when working with old bouillon or agar, to heat it up about once or twice a week to expel the dissolved gases. Gelatin tubes apparently do not require this precaution. At least the same set of gelatin tubes have been used for more than six months without encountering any difficulty.

Failure to grow, however, is more often traceable to the culture employed than to the medium itself. Thus experiments with bouillon tubes of diverse age, ranging from one day to four months, were found to give negative results with most of the old tubes when the inoculation was made from old cultures, but when made from perfectly fresh, vigorous cultures, no difficulty was experienced in obtaining positive results in all of the tubes.

In cultivating anaerobic bacteria, it is therefore desirable to employ either fresh or reheated nutrient media and to inoculate from fresh, vigorous cultures.

With reference to the nutrient media proper, it can be readily shown that the addition of peptone favors the growth of anaerobic bacteria. Bouillon without peptone is a very poor medium for this purpose. When 1 per cent of peptone is added the nutrient qualities of the medium are strikingly improved and this effect is still further brought out by increasing the amount to 2 per cent. Any considerable addition above this amount is without value and if anything tends to diminish the nutrient value of the medium.

The culture media can be still further improved by the addition of 2 per cent of glucose as was originally recommended by Liborius. The sugar is said to act as a reducing substance whereby any free oxygen that may be present is removed and thus the growth of the anaerobic germs is assisted. The action of other reducing substances has been tested by Kitasato and Weyl, and although similar beneficial effects may be obtained by the use of small amounts of various organic reducing substances, nevertheless their more or less poisonous action prevents their general use. Several of these, as sodium formate, sodium indigo sulphate, and resorcin have been strongly recommended by Kitasato and Weyl. There are times undoubtedly when the addition of these substances may prove useful. Thus, sodium indigo sulphate may serve as an indicator of the reducing action of a given germ. For general purposes, however, they possess no marked advantage.

Sodium indigo sulphate was used to indicate reduction changes as early as 1858 by Traube. In 1887 Spina employed this compound and also indigo blue and methylene blue for similar purposes. Finally in 1890 Kitasato and Weyl, independently of the others, studied the action of sodium indigo sulphate on the growth of anaerobic bacteria, and recommended its use in additions of 0·1 per cent. Braatz employed it in smaller amounts, 1,000 to 6,000 or 7,000.

The addition of litmus to the nutrient medium is often of very great value. Litmus was originally recommended by Buchner to indicate changes in reaction produced by bacteria. Subsequently Cahen proposed to use it, not only as an indicator of the reaction, but also for its reducing powers. Many bacteria, especially the anaerobic forms, readily reduce litmus to a colorless luco-substance which, according to the reaction, becomes converted into a red or blue color as soon as oxygen is admitted. If glucose is present acids are formed and as a result the litmus is colored red, otherwise it remains violet.

To some extent the addition of litmus favors the growth of these micro-organisms but its special value rests in the protecting action which it exerts on anaerobic germs. Cultures of anaërobic bacteria, as those of tetanus, malignant œdema and symptomatic anthrax preserve their vitality for many months even in liquid media, exposed to air, provided they are colored with litmus. This peculiar and valuable action is perhaps due to the litmus absorbing certain rays of light which tend to destroy these organisms.

Another substance which can be employed to very great advantage in the culture

of anaerobic bacteria is gelatin. This substance has not to my knowledge been recommended as an addition to nutrient media for improving their value for anaerobic work. As a matter of fact the addition of small amounts of gelatin is of as much value as the addition of peptone. Additions of 2 to 5 per cent gelatin have been used with great satisfaction.

Perhaps of more importance than this beneficial action of small amounts of gelatin is the fact that suitable additions of gelatin to the nutrient media render it possible to obtain cultures of all of the pathogenic anaerobic bacteria under ordinary aerobic conditions. It has been previously stated that the ideal method of growing anaerobic bacteria would be to cultivate them in the presence of air, without any special apparatus, as is ordinarily done with aerobic bacteria. This goal is partially reached by deep stich cultures in glucose agar and gelatin, but these media are solid and the access of air is prevented by the upper layer.

The object is more nearly attained by the following method in which liquid media are employed, presumably with full access of air. The method has been used during the past year with perfect success in cultivating the bacilli of tetanus, malignant œdema, symptomatic anthrax, and the Bacillus œdematis maligni, No. II, and is adapted for keeping up pure cultures of these bacteria.

The medium employed is ordinary nutrient 10 to 12 per cent gelatin containing 2 per cent of glucose and colored distinctly blue with litmus. Ordinary test tubes are filled with this medium to a height of 4–5 cm. These tubes when inoculated with pure cultures of the anaerobic bacteria and set aside in the incubator for twelve to twenty-four hours at 37° to 39° C. develop rapidly. The litmus is completely decolored, an abundant growth of the germ takes place, and considerable gas is given off. All this, in spite of the fact that the gelatin is liquefied, and that the oxygen of the air, at least apparently, has full access to the growth. It has not as yet been ascertained whether this development of the anaerobic bacteria is due directly to the gelatin that is present, or whether it is the result of the viscosity of the liquid which may possibly prevent penetration of oxygen.

In the above manner it is possible to obtain with the greatest ease a large and abundant growth of anaerobic bacteria in a liquid medium. Furthermore, it should be stated that these litmus-glucose gelatin cultures preserve their vitality for a greater length of time than ordinary agar stick cultures. Thus, cultures of the four anaerobic bacteria mentioned, when four to six months old, possess apparently as much vitality as when perfectly fresh.

Attempts have been made to obtain a liquid medium which would grow the anaerobic bacteria as readily and as surely in the presence of air and at the body temperature as the 10 per cent glucose gelatin. This has been partly realized by employing an alkaline bouillon containing 2 per cent each of gelatin, peptone, and sugar. Anaerobic bacteria taken directly from the body grow in this bouillon under ordinary aerobic conditions. Care must be taken that the bouillon is fresh, or but recently reheated, and that it is not less than 7 or 8 cm. in height. The bacilli of symptomatic anthrax and malignant œdema, and the B. œdematis maligni No. II have thus been grown successfully in the presence of air. The cultures, however, have not been obtained with any degree of constancy. Failures frequently occur for some unaccountable reason.

In conclusion, by way of recapitulation it may be said that the following nutrient media, with or without litmus, and slightly but distinctly alkaline in reaction, have been employed with best results in cultivating anaerobic bacteria. (1) Beef bouillon with addition of ½ per cent common salt, 2 per cent glucose, 2 per cent peptone. (2) Beef bouillon as above with the addition of 2 per cent of gelatin. (3) Nutrient 10 to 15 per cent gelatin with the same additions of salt, peptone, and glucose as above. (4) Nutrient 1½–2 per cent agar with the same additions of salt, peptone, and glucose as above.

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A NEW ANAEROBIC BACILLUS OF MALIGNANT ŒDEMA.

By FREDERICK G. NOVY, Sc. D., M. D.

Under the name "Septicémie" Pasteur, in 1877, described a new experimental disease. The affection, according to Pasteur, was characterized by a most intense inflammation of the muscles of the abdomen and extremities, by accumulation of stinking gas in divers places, especially in the axial regions. The lungs and liver were

decolored, while the spleen, though not enlarged, was often softened, and the heart was free from clot. These effects were ascribed by him to a bacillus—vibrion septique—which formed threads so transparent as to easily escape observation and in the blood they were said to attain considerable length. This bacillus, the first anaerobic disease germ, was successfully cultivated by Pasteur, Joubert, and Chamberland, and later by Gaffky and others.

In 1881 Koch pointed out that the characteristics of the disease as described by Pasteur were largely due to secondary causes—that is, to the presence of foreign bacteria—and that when pure material was employed the result was quite different. In such cases the fluid which fills the subcutaneous tissue, to a greater or less extent from the point of inoculation, is no longer of a gelatinous consistency, but is composed rather of a faint reddish colored serum, free from odor and gas. The internal organs show but slight changes. The spleen is usually enlarged and darker and the lungs are of a pale grayish-red color. In the subcutaneous exudate anthrax-like bacilli are found which are usually non-motile, although occasionally some will be found possessing motion. These are also found in varying numbers in the blood, at times appearing to be entirely absent and again are very numerous. They are never absent from the surfaces of the organs in the thoracic and abdominal cavities. In mice it is not possible microscopically to distinguish the disease from anthrax; the serous exudate in the subcutaneous tissue of these animals is very small. The spleen is enlarged, dark colored, and softened as in anthrax, and the bacilli do not predominate on the serous surfaces of the internal organs, but, as in anthrax, are present in large numbers in the organs and blood vessels.

Owing to the fact that in other animals than mice the bacilli are especially common in the subcutaneous tissue and are rare in the blood, the term "septicémie," as used by the French school, was deemed inappropriate by Koch, and he therefore suggested for this disease the name malignant œdema.

From the above description it will be seen that the chief characterestic of the disease lies in the œdematous condition brought on by the presence of a well-defined microörganism. Although at first a purely experimental disease, it was shown later to occur in domestic animals, as the horse (Kitt, Jensen, and Sand), and also in man (Brieger and Ehrlich), and was described by Chauveau and Arloing as the "septicémie gangreneuse."

In recent years a number of instances of malignant œdema have been reported in man, but unfortunately the diagnosis usually rests on the œdematous condition and on the presence of bacilli which from their microscopic appearance are assumed to be those described by Pasteur, Koch, and Gaffky. A thorough and exact identification has been made in but few instances. In view of these facts it is proper to ask whether or not such cases are true instances of malignant œdema. The production of an œdematous condition is not a sufficient criterion, either taken alone or in connection with the presence of a bacillus having the size and form of the well-known bacillus of malignant œdema.

An œdematous condition is induced to a greater or less extent by the bacilli of anthrax, and of symptomatic anthrax. The bacillus cadaveris of Sternberg has a similar action and only recently Klein has described an aerobic bacillus of malignant œdema which is regarded by Sanfelice as identical with his "bacillus pseudo-œdematis maligni." All of these microorganisms therefore give rise to chemical products which, by their action on the animal body, induce a more or less marked œdema.

The bacillus of Pasteur and Koch is therefore a cause, but not the only cause, of œdema. It must be evident on *a priori* grounds that other bacilli may exist which give rise to the same or similar products as the classical bacillus of malignant œdema, and that therefore they may give rise to the same condition in animals. The only distinction, if any, is to be sought in the microorganisms which induce these effects.

A very interesting case of this kind was met with last winter, and furnishes the subject-matter of this paper. Three guinea pigs were injected, in connection with

another line of work, with a solution of milk nuclein. The latter was prepared from fresh casein obtained from milk after Hammarsten's method. The casein was digested at 37° C. with pepsin and hydrochloric acid, and the precipitated nuclein, after filtration and washing, was dissolved in 0·25 per cent sodium carbonate, and the solution thus obtained was the one employed for the injections.

Within a few hours the animals became very quiet and unwilling to move. The respiration became labored and a marked swelling over the abdomen was noticeable. This, on examination, gave fluctuation and crackling, showing the presence of fluid and gas. All three animals died in from twenty-four to forty-eight hours, and on post-mortem examination the same striking condition was observed in all.

The subcutaneous tissue was permeated with a thick (about 1 cm.) reddish or dark-colored gelatinous œdema, which at times was so adherent as to necessitate the use of a sharp scalpel in reflecting the skin. The subcutaneous blood vessels were deeply engorged; hemorrhagic spots were also present, and the muscles of the trunk were colored deep red. The thoracic and abdominal cavities contained considerable serous exudate. The heart was in diastole and the lungs pale or mottled red. The liver was soft, but the spleen was not enlarged.

Cover-glass preparations made from the subcutaneous tissue and peritoneum showed enormous numbers of a slender, rather long bacillus, which was almost invariably single. This was also present in the heart blood, lungs, liver, spleen, and kidney. Streak preparations made from the peritoneum and stained with gentian violet showed, in addition to the bacilli which possessed the form and size of the bacillus of malignant œdema, the presence of colorless spiral bodies, the exact significance of which was at first overlooked, but later on in the work they were found to be large flagella. Such a preparation showing bacilli and three spirals is seen in photogram No. 1.

The post-mortem appearances and the microscopical characteristics of the bacillus present suggested at once that these were cases of malignant œdema. This view was still further strengthened when attempts at culture showed that the bacillus was an obligative anaerobe. On further study, however, the bacillus was found to be distinct from the classical one described by Pasteur, Koch, and Gaffky. It is proposed to provisionally designate this new micro-organism as the bacillus œdematis Maligni No. II.

Morphological characters.—The bacillus, as it occurs in the animal body, as for example in a streak preparation from the peritoneum, presents the form of a perfectly straight, slender rod with slightly rounded ends. The rods are almost invariably single and vary in length from 2·5 to 5 μ. The most common length is from 3·5 to 4·3 μ. The width is 0·8 to 0·9 μ.

Very short, straight threads may also be found occasionally. These are usually about 8 to 14 μ in length and only very rarely do they attain a length of 22 to 35 μ.

The streak preparation from the above source, stained with gentian violet, usually shows, on careful examination, colorless spiral forms, which usually vary in length from 17 to 25 μ, and occasionally some 43 and 63 μ in length have been observed. In width these spirals vary from a thin, wavy line, having the same thickness throughout its length, to forms which are spindle-shaped, tapering at both ends to a scarcely visible line. The width of such spindle forms usually ranges from 1·7 to 2·6 μ.

At first it was supposed that these colorless forms might be artificial in nature due to shrinking of the proteid matter on coagulation, but this view was soon untenable, since on examining hanging drops of the reddish serous exudate in the abdominal cavity the same bright, colorless spirals could be found. Subsequently these spirals were found in pure cultures of the germ, and are demonstrated to be giant flagella.

When cultivated under the usual anaerobic conditions, the form sometimes undergoes marked changes. Thus in stich cultures in agar the germ forms straight, or but slightly bent narrow rods, and also short threads which are usually bent, twisted,

or wavy. On inclined agar the rods appear to be much more bent, or comma-shaped, and at the same time very long threads form which are oddly twisted and rolled up, as if involution changes were taking place. When grown in bouillon the protoplasm of the cell is markedly granular or contracted, and numerous small round refracting bodies, many of which are free, while others are in the end of the bacilli, can be observed.

Motion.—The bacillus is motile, and this condition can be best observed by examining the colonies in deep agar cultures with a suitable objective, as the D of Zeiss. In hanging drops, however, only a very slight movement of an oscillatory character is to be made out. In this respect it differs strikingly from the bacilli of symptomatic anthrax and malignant œdema, which are actively motile. Sometimes a marked forward, wavy motion can be observed, and this is especially true where young culture is employed and the examination is made as soon as possible, that is before the air begins to exercise an inhibitory action.

The flagella are readily stained by Löffler's method, without the addition of acid or alkali to the mordant. Cover-glass preparations stained in this manner present a striking appearance. Each bacillus is equipped with several long, wavy flagella, which are attached to the sides and ends, as is the case with Eberth's bacillus, the bacillus of malignant œdema, and several other well-known organisms. The flagella vary considerably in size and thickness. But by far the most characteristic feature of these preparations is the occurrence of those enormous flagella which Löffler described in 1890 in connection with symptomatic anthrax. These giant whips, as they may indeed be called, are usually spindle-shaped, tapering slowly on both sides from the thickened middle to the slender, scarcely-visible ends, and the border has a beautiful wavy appearance. This form of spiral is well represented in photograms No. 2 and No. 5.

The length varies considerably, but in artificial cultures is usually from 40 to 50 μ, and some have been found 72 μ, and even more in length. The width at the middle portion likewise varies greatly, and is not necessarily proportionate to the length. Thus we may find giant whips, without any median enlargement, presenting the form of a simple long, wavy line often with as many as twenty bends. This appearance, however, is rare, and is met with only occasionally under conditions not yet clearly made out. The usual form, however, is spindle-shaped, and the width of the center varies from 2 to 4 μ, and not infrequently attains 7 μ or even more. A better idea of these dimensions can be obtained by comparing them with the length of the bacillus and of the ordinary flagella. The average length of the bacillus can be placed at about 3 μ, and the average length of the ordinary flagella at 6 to 9 μ.

In order to find these giant whips it is not necessary to resort to the staining method of Löffler. Indeed they were first met with in examining hanging drops of the thin bacillus. Their size is such that they can be readily seen in unstained preparations with a Zeiss D or with a one-twelfth homogeneous oil immersion objective, and, when stained, the larger spirals can be even found with an A objective.

The large spindle-shaped whips possess invariably sharp, wavy borders, but fail to show any special structure. In very wide spirals, however, this is not the case. By careful focusing the central thickened portion can be resolved into several wavy lines running parallel to the border. In one instance five such lines were observed, but at other times only one or two could be found.

Another peculiar feature deserves mention in this connection. Instead of the characteristic spindle-shaped whip already described, we may meet with forms which are double spindle-shaped, and look as if two large spirals were connected together at one end and then diverged. The common end is attached, as has actually been observed, to the bacillus. The attachment of the single giant spirals can often be seen in carefully-prepared specimens. Similar double spirals have been observed in agar cultures in hydrogen of the bacillus of symptomatic anthrax.

The formation of these large spirals is closely connected with the nature of the nutrient medium on which the bacillus has developed. Thus bouillon cultures are not

satisfactory. Gelatin cultures are better, and the best results are obtained with agar. Streak cultures on inclined agar in hydrogen, or deep stich cultures in agar in hydrogen or in air furnish excellent material. Especially is this true of the condensed liquid which accumulates in the bottom of the inclined agar tubes or on the top of perfectly fresh agar stich cultures. In bouillon, in an atmosphere of carbonic acid, the spirals are either small or entirely lacking, whereas the germ itself is in excellent condition—a marked contrast with hydrogen cultures.

The spiral forms described as occurring in the body of guinea pigs and rabbits that died after inoculation are identical in form, size,and appearance with these flagella.

As already mentioned, similar spirals have been found and photographed by Löffler in cultures of the bacillus of symptomatic anthrax on inclined blood serum in hydrogen. I have found these same spirals in stich cultures of symptomatic anthrax bacillus in fresh glucose agar, in air, and more especially in the condensed liquid which accumulates on the top and which is turbid from actively growing bacilli.

Similar long spirals have been also found in hanging drop examination of the bacillus of malignant œdema growing in the condensed liquid in the bottom of tubes of inclined agar, in hydrogen. The spirals, however, appear to be much more rare, and are therefore more difficult to find than in the two bacteria mentioned.

Tetanus cultures have not been specially examined for these large spirals, but at various times during the last year or two, cover-glass preparations made from agar-cultures and stained with concentrated gentian violet have shown distinct long slender spirals. It would seem, therefore, that all of the anaerobic pathogenic bacteria known thus far are capable of giving rise to unusually developed flagella.

As to the nature of these giant flagella very little can be said. Löffler who was the first, and to my knowledge the only one, to observe these strange forms regarded them as bundles or aggregations of flagella (Haarzopfen). This, however, can scarcely be considered a satisfactory explanation, inasmuch as the border of these large whips is almost invariably sharp and clear-cut. At no time has a spiral been found to be attached to more than one cell, and then always it is attached by the slender end. If made up of aggregations of flagella we might occasionally expect to find frayed out edges to the spirals and bacilli attached to different parts of the spiral, but such is never the case. Furthermore, as already stated, we may have exceedingly long slender whips without any dilation of the middle portion. The conditions which give rise to the latter form, or elongated flagellum, undoubtedly also produce the characteristic spindle-shaped form. It remains to be seen whether it is best to consider these abnormally large flagella as involution forms analogous to the malformations which the bacterial cell itself at times undergoes.

Spore formation has at no time been observed. In this respect it differs markedly from the three well-known anærobic bacteria, those of tetanus, malignant œdema, and symptomatic anthrax, which invariably, under parallel conditions, readily yield an abundance of spores. In liquid media, as bouillon, in an atmosphere of hydrogen the protoplasm of the cell, which is ordinarily homogeneous, becomes granular, and a bright refractive body appears at one end. Occasionally two such bodies are observed, one at each end. The original form of the cell is in nowise changed as a result of the presence of these bodies, which moreover are readily stained by the aniline dyes.

Although the existence of spores can not be demonstrated as yet, the bacillus nevertheless possesses a very high degree of resistance. Thus when exposed to a temperature of 58° C. for one hour it develops readily when subsequently placed under suitable conditions.

Extreme cold is also apparently without effect, since cultures may be frozen solid for twenty-four hours and still maintain their vitality.

It is readily stained by the aniline dyes and also by Gram's method, which is especially valuable in staining of sections.

Cultural Properties.—The bacillus is an obligative anaerobe, and therefore requires

special care in its culture. The best media for its growth are a slightly alkaline bouillon, gelatin, or agar containing 2 per cent of peptone and 2 per cent of glucose. The addition of 2 per cent of gelatine likewise seems to assist its growth to a marked degree. The addition of litmus to the nutrient media not only appears to favor the development of the bacillus but also seems to exert a protective action. Thus, litmus bouillon or gelatine cultures preserve their vitality better than cultures exposed to the light. Strongly alkaline media permit the growth of the bacillus, but such cultures soon lose their vitality—some in a few days.

All the cultures referred to in the following description were made in the special apparatus which is described by me in a separate paper.

No growth takes place at the ordinary tempera ture, that is below 24° C. Above this limit it grows readily, and its optimum is about 35° to 38° C.

Growth takes place in a vacuum, or in an atmosphere of hydrogen, carbonic acid, nitrogen, or even in illuminating gas. In this respect the bacillus behaves the same as the tetanus bacillus, which develops under the same conditions, whereas the bacilli of malignant œdema and symptomatic anthrax have thus far failed to develop in an atmosphere of illuminating gas, but have been successfully grown in carbonic acid.

Carbonic acid, contrary to the commonly accepted view, does not seem to exercise any poisonous or even inhibiting action on the growth of this bacillus and those of tetanus, malignant œdema, and symptomatic anthrax. Cultures of the first two have been kept in carbonic acid for more than a month without any apparent effect. Furthermore, bouillon cultures in this gas show excellent well-formed rods which are much more favorable in appearance than cultures grown in hydrogen. The granulation of the protoplasm and the small terminal refractive bodies met with in hydrogen cultures are lacking in carbonic acid cultures. Giant whips have been absent in the few examinations that have been made for that purpose. It may be stated that in order to be successful with carbonic acid it is necessary to employ perfectly fresh, or reheated, distinctly alkaline culture media and that the inoculations be made from fresh vigorous cultures.

Colonies can be easily obtained in deep cultures in agar in ordinary test-tubes. The flat bottles or dishes employed by Král for his bacteriological museum are well adapted for this purpose, as they can be placed on the stage of the microscope and examined with ease. Not only can thus the form of the colony be observed but also the presence of motion can frequently be ascertained. Photogram No. 4 is made from such a culture. Colonies can also be obtained by making successive streaks on inclined glucose agar, or by resorting to Esmarch roll tubes or agar plates in Botkin's apparatus. The latter, ho wever, have not been very satisfactory for some as yet unexplainable reason.

Under favorable conditions excellent colonies develop in fifteen hours in glucose agar at 38° C. They then appear as small white pinhead growths, which, under the microscope, look as if composed of a dense whorl of threads. The smaller colonies simply form a network of branching lines, resembling very much the branching colonies of tetanus bacillus. The larger colonies have a dark center, which is surrounded by an irregular, frayed border of very delicate filaments. These irregular borders on higher magnification are distinctly granular in appearance, and numerous small round dark spots are seen, which are usually at the end of the threads.

Stich cultures in glucose agar are characterized by a distinctly visible growth along the entire line of inoculation, with the exception of the upper layer of about 1 cm., where no growth takes place owing to the presence of air. The growth, however, is much less distinct than either that of the bacillus of malignant œdema or that of symptomatic anthrax. At a temperature of 38° C. development takes place in twelve to sixteen hours. During the next twenty-four hours the growth reaches its maximum, after which the stich gradually becomes less visible. An energetic production of gas appears, and, as a result, the agar is torn apart and

forced up the tube. The production of gas is marked in alkaline tubes and is almost entirely absent in neutral or acid nutrient media. No marked odor is observable in cultures of the bacillus after it had been grown for several months, but the earlier cultures, shortly after it had been isolated, possessed a strong penetrating odor of butyric acid.

When placed in an atmosphere of hydrogen, growth takes place along the entire stich, and even the surface of the agar becomes covered by a thin white film. Stich cultures in hydrogen, and even in air, made in perfectly fresh glucose agar—that is, immediately after solidification—frequently have a drop or two of water of condensation on the surface, and in such cases this liquid is turbid and full of small gas bubbles from the presence of actively growing bacilli. This peculiar instance of growth, apparently in contact with air, has also been observed with the bacilla of symptomatic anthrax and of malignant œdema. In all three cases this liquid is an excellent place for the spiral forms already described.

Streak cultures on the surface of inclined glucose agar, grown in hydrogen, form a distinct white pellicle. Isolated colonies are roundish, white, somewhat elevated, and show markings. The water of condensation in the bottom of the tube likewise has an abundant growth. These cultures are likewise an excellent source for giant whips.

Owing to the relatively high temperature which the bacillus requires in order to grow it follows that no development takes place in solid gelatin. Nevertheless cultures can be obtained in liquid gelatin with as much ease as with ordinary aerobic bacteria. These cultures are noteworthy because they are apparently made in the presence of air. With the exception of deep cultures in agar they are the only means of obtaining growths of the bacillus without resorting to the usual special apparatus for anaerobic bacteria.

The medium employed is ordinary, 10 to 15 per cent gelatin containing 2 per cent glucose, with or without litmus. The tubes are inoculated and set aside in an incubator at the body temperature. The gelatin of course, is liquefied, but in twelve to eighteen hours gas bubbles will be seen rising to the surface and at the same time the liquid becomes turbid. The maximum growth is reached in twenty-four to thirty-six hours. The germ then subsides in flakes and forms a light florculent sediment 1 to 2 cm. in height, while the liquid above becomes perfectly clear and the surface is free from scum. When set aside now at the temperature of the room the gelatin does not solidify but remains permanently liquefied.

The other anaerobic bacteria, as the bacilli of tetanus, malignant œdema and symtomatic anthrax can be cultivated in the same manner.

Attempts have been made to replace the 10 to 15 per cent gelatin by bouillon media containing a less amount of gelatin—2 to 5 per cent. These attempts have been partly successful, but often failure in growth results for some unexplainable reason. Litmus-colored media are apparently better than uncolored for this purpose. The greater number of tubes which then develop can only be ascribed to the favorable action of the litmus in excluding certain rays of light. The best medium found thus far is a fresh alkaline bouillon containing 2 per cent each of gelatin, glucose, and peptone. The tubes should be filled to a height of 6 to 8 cm. With such a medium perfectly pure cultures have been grown from inoculated animals under ordinary aerobic conditions at 38° C.

Bouillon tubes when inoculated and placed in hydrogen almost invariably develop. Failure to grow is commonly due to the culture from which the inoculation is made, since it may be weak or dead. The bacillus develops more or less abundantly in bouillon media of most varied composition. Old bouillon tubes are almost as good as when freshly prepared, and in this respect a marked difference exists between the bacillus of symptomatic anthrax, which, according to Kitasato, requires perfectly fresh media in order to grow.

The addition of 2 per cent of Witte's peptone and 2 per cent of glucose to the

bouillon furnishes an excellent nutrient medium. Gelatin appears to favor the growth of the bacillus to the same extent as peptone. Equally good results can be obtained by substituting 2 per cent of gelatin in place of the peptone. The best results, however, have been obtained by the addition of 2 per cent each of gelatin, peptone, and glucose.

The addition of sodium-indigo sulphate to bouillon or other culture media is without any beneficial effect, and the only advantages it possesses is to indicate the reducing action of the bacillus. Culture media containing this substance are discolored by the growth of the bacillus in hydrogen, but on exposure to air the color returns.

Litmus, for reasons already given, is to be preferred to sodium-indigo sulphate. Furthermore, it is of value as an indicator of the reducing action and also of the reaction. Thus, the litmus-colored medium is first discolored, showing a strong reducing power of the organism. The coloring matter is reduced to a colorless leuco-compound, which on subsequent exposure to air takes up oxygen and becomes converted into a pigment. If the bacillus has given rise to acid products their presence will be indicated by the wine-red color of the culture medium.

In this manner it is easy to demonstrate the production by this bacillus of an acid reaction in bouillon containing glucose, whereas in the absence of glucose the color returns to a violet or blue. In this regard it agrees with the bacilli of symptomatic anthrox and of malignant œdema, whereas the bacillus of tetanus does not give rise to an acid reaction in glucose media, and hence is colored blue.

The characteristics of the bouillon culture are the same, no matter whether developed in hydrogen, carbonic acid, illuminating gas, or in a vacuum. In from ten to fifteen hours at 38°C. the liquid becomes turbid and a greater or less amount of gas is given off, depending upon the age and alkalinity of the bouillon. Subsequently, in one and one-half to two days the suspended growth gathers in flakes which settle to the bottom and form a light flocculent sediment 1 to 2 cm. in height, which readily rolls about when the tube is inclined. The supernatant fluid is perfectly clear and free from surface scum. The bouillon cultures are very distinct from those of either symptomatic anthrax or malignant œdema. Thus, the latter two form a fine growth which partly settles to the botton, forming a white, compact, nonrolling sediment scarcely one-half cm. high, while the liquid above is turbid and remains so for several days.

Vacuum cultures can be readily obtained. A perfect vacuum is not necessary, since excellent growths are obtained by the apparatus mentioned when the pressure is diminished by 60 to 65 cm. It may incidentally be added that the other three anaerobic bacilli likewise grow under these conditions.

The so-called "mixed" aerobic cultures of this bacillus have also been thus far successful, and will be described later in connection with experiments on animals.

The differences that exist between this new bacillus and the bacilli of symptomatic anthrax and of malignant œdema may be briefly summarized as follows:

Bacilius of malignant œdema No. II in bouillon cultures, etc., is slightly longer and thicker than either of the other two. It shows no such active motion as the others, nor does it form spores. Giant whips are much more common. In bouillon culture the bacillus is often bent or comma-shaped and is single or forms short threads of 2 to 5 cells, which are invariably bent or twisted; whereas both of the others show usually straight single rods and only rarely short threads, which are straight.

Cultural differences in bouillon and in agar are also marked and have already been mentioned. Further differences exist in the greater pathogenic action and in the more rapid effect on temperature, as seen in Table VI.

Pathogenesis.—The extremely virulent character of this new bacillus can be readily demonstrated on a large variety of animals. The rabbit, guinea pig, white mouse, white rat, pigeon, and cat have been employed for this purpose, and all are highly susceptible. Subcutaneous injection into these animals of a one-fourth cc., or even

one-tenth cc., of a pure culture invariably results fatally, and death takes place usually in from twelve to thirty-six hours.

The first symptoms observable after injection is an indisposition to move about; the animal rests quietly in one corner and will not stir even when prompted. Later the animal becomes uneasy, frequent cries of pain are given, and marked swelling over the abdominal region takes place. The animal then usually lies on its side and can not stand up. Distinct crackling and fluctuation can be made out over the abdomen. Slight twitchings or convulsive tremors sometimes pass over the animals. The respiration becomes very slow and finally death results.

The most marked effect is seen in the rapid fall of temperature. This takes place within a few hours after the injection, without any previous rise in temperature, and continues falling till death occurs. In rabbits the temperature has been observed to sink as low as 29° C. a half an hour before death. A similar fall in temperature has likewise been observed in guinea-pigs. Table VI shows the comparative effect on temperature in guinea pigs injected subcutaneously with one-half cc. of fresh bouillon cultures, one and one-half days in hydrogen, of œdema bacillus No. II, bacillus of malignant œdema, and of symptomatic anthrax.

On post-mortem examination essentially the same condition is found as that which was observed in the original guinea pigs that died of infection. Thus an extensive, colorless, jelly-like subcutaneous œdema covers part or whole of the anterior part of the body and at times extends to the extremities. Occasionally it is slightly colored red. Gas is usually present, although in very small amount, and is often confined to the median line over the abdomen or to the axillæ. Owing to the consistency of the œdema the skin can be readily reflected from the body. The subcutaneous blood vessels are as a rule engorged; slight hemorrhagic spots are often present and the abdominal wall bright red in appearance.

The pleural cavity contains an enormous amount of colorless serous exudate, which at first is liquid, but if the examination is delayed some time after death it becomes gelatinous. The colorless fluid when transferred to a sterilized test tube coagulates to a solid mass in a few minutes. In rabbits and guinea pigs this condition of the pleural cavity is especially marked. The cavity is often full, and from such cases 50 to 60 cc. of the serous fluid have been removed.

The lungs are usually pale and flabby. The heart is in diastole and its blood vessels are gorged full of blood. In the abdominal cavity a similar condition is observable. The amount of exudate, however, is relatively much less. The same tendency to gelatinize is seen, and in the larger animals a fibrous network often covers the intestines. The peritoneum is almost invariably bright red in appearance. The internal organs show very little change, and usually the bladder is full.

One marked difference is noticeable in the appearance of the subcutaneous tissue in the animals inoculated with pure cultures and in the guinea pigs inoculated with milk nuclein. The latter presented what might indeed be called a terrible condition. The subcutaneous tissue was filled with a solid gelatinous or fibrinous exudate which was exceedingly tough and so firmly connected the skin with the walls of the body that it necessitated the cutting away of the skin with a scalpel. Furthermore, the exudate and muscles were strongly colored red and more than a centimeter in thickness.

In the experiments with pure cultures this frightful condition was, as a rule, absent. The subcutaneous œdema was colorless, soft, and gelatinous in consistency, and not adhesive. Occasionally, however, the same condition is met as described above, and in such cases no foreign bacteria could be found present.

Another striking difference was observable on microscopical examination. Cover-glass preparations from the œdema, fluids, muscles, peritoneum, etc., of the milk-nuclein guinea pigs showed enormous numbers of this new bacillus, as shown in photogram No. I. On the other hand, in animals that died after inoculation with pure cultures the bacilli were found in only relatively small numbers. Very often

it was necessary to examine half a dozen cover glasses before their presence could be established, and not infrequently it was impossible to find any. In the few exceptions mentioned the bacteria, however, were also found in enormous numbers.

The fact that the experimental animals died very frequently without the presence of the bacillus showed that death was directly due to the toxic products injected and not to any development of the bacillus in the body. In the original guinea pigs, however, it was clearly evident from the enormous numbers of the germ present that it did find in the body suitable conditions for its development, and death resulted when it had produced a sufficient amount of poisonous chemical products within the body. In the latter animals, then, the bacillus was capable of developing, whereas in the experimental animals inoculated with pure cultures no such favorable conditions for growth was as a rule present.

A rational explanation of this difference would be that in the experimental animals the natural resistance is such as to prevent or greatly retard the growth of the bacillus, whereas in the original guinea pigs this same resistance must have been lowered by some product or organism to such an extent that the animal became an excellent medium for the development of the germ.

These original guinea pigs, as already stated, were injected with a milk-nuclein solution, prepared by digestion of casein with pepsin. The precipitated nuclein was filtered off, washed, and dissolved in dilute alkali carbonate. This solution therefore contained nuclein, small amounts of salts of lactic acid, besides any bacteria that might be present and resist the action of the alkali. Experiments were made to ascertain which of these elements favored the growth of the bacillus in the body. Several trials were made with fresh nuclein prepared in exactly the same manner, but without effect.

Injections of lactic acid were more successful. Butyric acid was also tried, but the results were not apparently as good. Thus, white rats Nos. 18, 21, 27, and 28, Table III, which received subcutaneously one-fourth cc. of a fresh bouillon culture and immediately afterwards one-tenth cc. of a 20 per cent lactic-acid solution, yielded on post-mortem examination the characteristic appearances, and enormous numbers of the bacilli were found. Control animals died in about the same time, but the bacilli were as scarce as usual.

Small amounts of phosphoric acid have effects similar to lactic acid, as seen in rat No. 22, Table III. In several instances injections of lactic or phosphoric acids did not produce the characteristic appearances or perceptibly increase the number of bacilli in the tissues. On the other hand, the animals that gave positive results were found to contain foreign bacteria, which undoubtedly had secured entrance into the body through the slight local slough.

A number of experiments were next made to ascertain to what extent foreign bacteria were capable of favoring the growth of this bacillus in the body. Instances of microbic associations are not entirely unknown. Thus, Roger (1889) was the first to show that pure cultures of the bacillus of malignant œdema, which in small doses produced no effect in rabbits, became intensely active and produced death in twenty-four hours if a culture of micrococcus prodigiosus was injected at the same time. More recently (1891) Penzo has shown that Proteus vulgaris acts in a similar manner, and, furthermore, the equally interesting and important fact was brought out that cultures of the anaerobic bacillus of malignant œdema could be obtained in the presence of air if the culture tubes were inoculated at the same time with either of the above germs.

The following experiments were therefore made to ascertain if this new bacillus was capable of growing in the presence of air, in "mixed" cultures. Ordinary bouillon tubes were inoculated with this œdema bacillus and also with the bacillus acidi lactici, micrococcus prodigiosus, Proteus vulgaris, and a coccus obtained from one of the milk-nuclein guinea pigs.

The tubes were then set aside in the incubator at a temperature of about 35° C.

for fifteen hours. At the end of that time the tubes were taken out and examined. A marked difference was observed between the "mixed" cultures and control tubes of the aerobic bacteria. The growth in the former was considerably more vigorous than in the control tubes. The "mixed" culture of Proteus vulgaris and œdema bacillus was most marked. A heavy flocculent sediment was on the bottom, considerable gas was being given off, and a strong butyric-acid odor was present. The "mixed" culture with lactic-acid bacillus also gave rise to much gas. Microscopic examination showed the presence in all four tubes of actively growing œdema bacilli.

A guinea pig (No. 16, Table I) inoculated subcutaneously with one-fourth cc. of the œdema-proteus vulgaris culture was found dead in nineteen hours. A post-mortem made at once showed a terrible condition. The skin was firmly adherent to the muscular walls of the body by a thick, reddish fibrous œdema. Considerable gas was present throughout the œdema, which, over the abdominal walls, was almost 1 cm. in thickness. The blood vessels were highly injected. The peritoneum was bright red; considerable serous exudate in the abdominal and thoracic cavities. The lungs were pale and collapsed; the heart was in diastole. A fibrous network covered the intestines. Microscopical examination showed the presence of enormous numbers of the œdema bacilli in the subcutaneous tissue, and on the peritoneum and in the spleen. The heart, blood, and the liver likewise contained the bacilli, but in small number.

The picture presented in the above animal was an exact counterpart of that in the milk-nuclein guinea pigs. This experiment and others of a similar nature show conclusively that this new œdema bacillus gives rise to intensely poisonous products, and that the fatal results following the injection of a pure culture of this germ are usually due to the toxic products injected. As a rule no appreciable multiplication of the bacillus takes place in the normal animal, but if, on the other hand, impure cultures are employed the conditions become so changed that an enormous multplication rapidly takes place, and the death which then results is due to the poisons elaborated within the body.

This is a striking illustration of a "mixed" infection. A small number of this anaerobic bacillus may be introduced into the body without any bad effect so long as it is simply a question between the germ and the normal resistance of the body. If, however, this resistance is lowered or the germ is enabled to multiply through the assistance furnished by such common saprophytic bacteria as may accidentally have been introduced, the outcome then becomes quite different and death results. What has thus been shown to be true for this bacillus is equally true for the other anaerobic pathogenic bacteria. The danger of infection lies not so much in the introduction of any of these bacteria by themselves as it does in the simultaneous or subsequent introduction of other nonpathogenic bacteria which, by their presence, render the body, or a portion of it, a suitable nidus for the development of these anaerobic forms.

A further study of this new microorganism, and more especially of its chemical products, is reserved for the near future.

EXPLANATION OF PLATE 1.

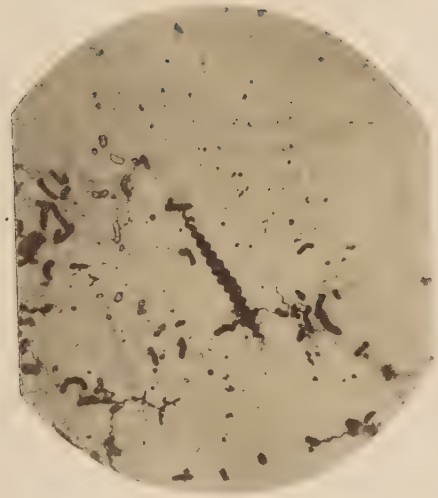
Photogram No. 1 shows a streak preparation from the peritoneal exudate of a guinea-pig, and is stained with gentian violet. In addition to the well-formed rods, two short and one long colorless spiral can be seen just above the middle. 340 × lamplight.

Photogram No. 2 shows a giant whip from an inclined agar culture in hydrogen, stained by Löffler's method. Near one edge are two rods with ordinary flagella. 340 × lamplight.

Photogram No. 3 shows a culture in Kral's flat tube, on foot, in glucose agar, presence of air, with colonies and production of gas. Natural size.

Photogram No. 4 shows a colony in glucose agar. 50 × sunlight.

Photogram No. 5 is made from the same cover-glass preparation as No. 1, and shows a spindle shaped giant whip. Two smaller ones are to be seen above it. 500 × sunlight.



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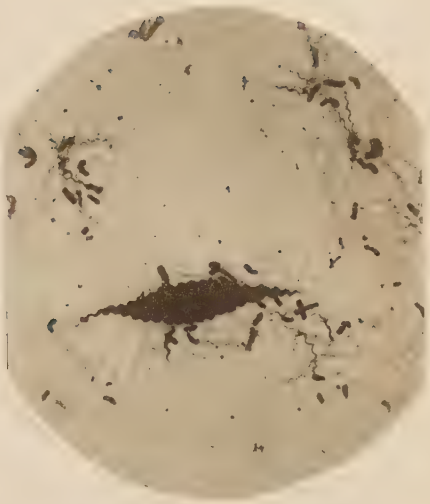

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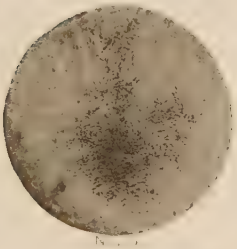

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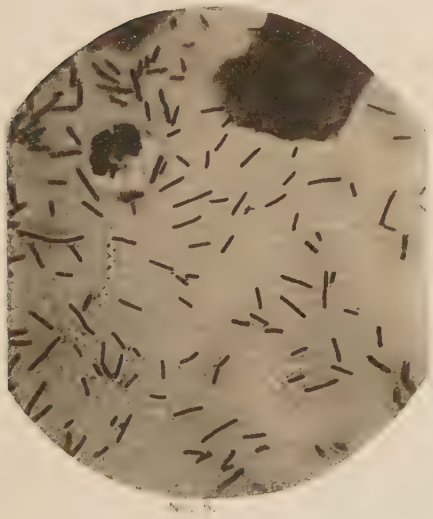

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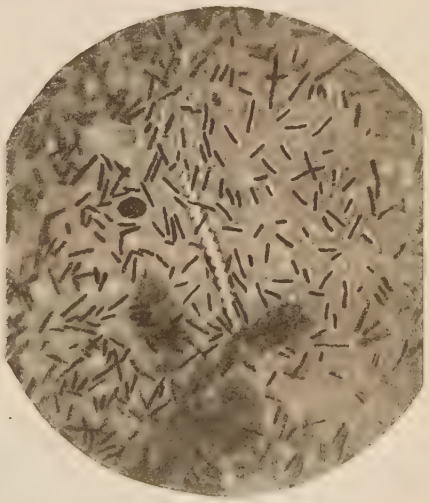

No. 6.

A NEW ANACROBIC BACILLUS.

TABLE I.—*Experiments with guinea-pigs.*

[In all cases bouillon cultures were used unless otherwise stated, and the injections were made subcutaneously over the abdomen.]

No.	Weight.	Culture used.	Dose.	Death in—	Bacilli.	Remarks.
	Grams.		*cc.*			
1	.....	9 d. vacuum.....	4	About 10 hours.	Few	
2	.....	....do	2	About 15 hours.	Good	
3	335	....do	1	18 hours	Few	
4	270	....do	½	17 hours	....do	
5	140	....do	¼	About 12 hours.	Very few .	
6	322	3 d. vacuum.....	¼	About 15 hours.	....do	
7	289	....do	¼	28 hours	(?)	
8	398	3 d. hydrogen	¼	About 15 hours.	Few	
9	381	3 d. vacuum.....	¼	....do	Very few .	
10	385	4 d. hydrogen	¼	About 12 hours.	None	
11	348	....do	⅛	About 14 hours.	....do	
12	530	....do	1/100	.....	.....	Recovered.
13	267	3 d. hydrogen.....	¼	17 hours	None	
14	228	7 d. hydrogen.....	¼	About 15 hours.	....do	Received previously two injections, ½ c. c. each, of 20 per cent lactic acid.
15	295	....do	¼	....do	....do	Received similar injections of butyric acid.
16	550	1 d., air, 37°	¼	19 hours	Very numerous.	Received mixed culture of the bacillus and Proteus vulgaris.
17	.....	....do	¼	.....	.....	Recovered. Received mixed culture of bacillus and lactic acid bacillus.
18	452	1½ d. hydrogen....	½	11 hours	Very numerous.	Spirals present.
19	725	....do	½	About 15 hours.	....do	Do.

TABLE II.—*Experiments with rabbits.*

1	1,860	3 d. vacuum.....	¼	About 15 hours.	(?)	
2	2,039	....do	¼	27 hours	Very numerous.	Spirals present.
3	1,760	....do	¼	About 15 hours.	(?)	
4	2,052	2⅓ d. hydrogen....	¼	4½ days	Few	Received injection of sodium lactate.
5	1,660	4 d. hydrogen.....	½	20 hours	None	Received 1 c. c. of 20 per cent lactic acid.
6	1,966	....do	½	About 30 hours.	....do	Received no lactic acid.
7	420	7 d. hydrogen.....	¼	42 hours	.....	Received previously 4 injections, 5 c. c. each, intraperitoneally, of sterilized serous fluid from thorax.
8	402	4 d. hydrogen.....	¼	39 hours	Very few .	
9	479	....do	¼	41 hours	(?)	Received 5 c. c. nuclein subcutaneously.
10	1,400	2½ d. hydrogen....	¼	About 36 hours.	Numerous.	Received ⅔ c. c. of 20 per cent lactic acid.
11	512	....do	¼	About 14 hours.	None	Received ½ c. c. of 20 per cent lactic acid.
12	554	....do	¼	....do	Numerous, but contaminated.	Do.
13	315	....do	¼	....do	Few	Received no lactic acid.

TABLE III.—*Experiments with white rats.*

No.	Weight.	Culture used.	Dose.	Death in—	Bacilli.	Remarks.
1	35	9 d. vacuum	$\frac{1}{2}$	About 12 hours	Numerous.	
2	40	do	$\frac{1}{4}$	20 hours	Few	
4	61	3 d. vacuum	$\frac{1}{4}$	About 15 hours		
5	59	do	$\frac{1}{4}$	About 30 hours	Very few.	
6	160	do	$\frac{1}{4}$	do	do	
7	101	do	$\frac{1}{4}$	do	do	
8	91	3 d. hydrogen	$\frac{1}{4}$	About 16 hours		
9	142	2 d. hydrogen	$\frac{1}{4}$	17 hours	None	
10	96	9 d. vacuum	$\frac{1}{4}$	39 hours	Few	
11	100	3 d. vacuum	$\frac{1}{4}$	51 hours	Very few.	
12	79	6 d. hydrogen	$\frac{1}{4}$	About 33 hours	do	
13	90	9 d. hydrogen	$\frac{1}{4}$	27 hours	Fairly numerous.	
14	85	3 d. hydrogen	$\frac{1}{4}$	31 hours	Very few.	
15	86	2 d. hydrogen	$\frac{1}{4}$	About 15 hours	(?)	
16	57	do	$\frac{1}{4}$	do	(?)	
18	157	$2\frac{1}{2}$ d. hydrogen	$\frac{1}{4}$	About 36 hours	Very numerous.	Received previous injection of $\frac{1}{2}$ c. c. of 20 per cent lactic acid.
19	137	do	$\frac{1}{4}$	8 hours	None	
20	32	4 d. hydrogen	$\frac{1}{4}$	About 15 hours	do	
21	56	$2\frac{1}{2}$ d. hydrogen	$\frac{1}{4}$	31 hours	Very numerous.	Received previous injection of $\frac{1}{10}$ c.c. of 20 per cent lactic acid.
22	42	do	$\frac{1}{4}$	About 15 hours	Numerous.	Received previous injection of 1 drop of phosphoric acid.
23	31	do	$\frac{1}{4}$	About 40 hours	Very few.	
24	43	do	$\frac{1}{4}$	About 12 hours	(?)	
25	35	do	$\frac{1}{4}$	do	None	
26	40	do	$\frac{1}{4}$	do	do	Received previous injection of $\frac{1}{2}$ c.c. of 20 per cent butyric acid.
27	42	do	$\frac{1}{4}$	About 60 hours	Numerous.	Received previous injection of $\frac{1}{10}$ c.c. of 20 per cent lactic acid.
28	38	do	$\frac{1}{4}$	About 15 hours	Very numerous.	Do.
29	39	do	$\frac{1}{4}$	do	Numerous.	Received previous injection of $\frac{1}{10}$ c. c. of 20 per cent butyric acid.
30	30	4 d. hydrogen	$\frac{1}{4}$	do	None	
31	25	do	$\frac{1}{10}$	About 13 hours	do	
32	43	do	$\frac{1}{100}$	10 days, 19 hours	Few	

TABLE IV.—*Experiments with white mice.*

1	20	4 d. hydrogen	$\frac{1}{4}$	About 13 hours.	Very few.	
2	12	do	$\frac{1}{10}$	About 15 hours.	None	
3	12	do	$\frac{1}{100}$	About 21 hours.	do	
4	18	do	$\frac{1}{4}$	About 14 hours.	Very numerous.	Received previously $\frac{1}{10}$ c.c. 20 per cent lactic acid.

TABLE V.—*Experiments with pigeons.*

1	290	4 d. hydrogen	$\frac{1}{2}$	About 12 hours.	Few	
2		do	$\frac{1}{2}$	3 days 20 hours.	Good	Received previously $\frac{1}{2}$ c.c. 20 per cent lactic acid.
3	317	do	$\frac{1}{4}$	17 hours	Very few.	
4	371	do	$\frac{1}{4}$	About 12 hours.	Few	Received previously $\frac{1}{4}$ c.c. 20 per cent lactic acid.

TABLE VI.—*Experiments with guinea-pigs.*

[Shows comparative effect on temperature of the three anaerobic pathogenic Bacteria. Each animal received ½ c.c. subcutaneously of a bouillon culture grown 1½ to 2½ d. in hydrogen at 38°.]

Time.	Œdema Bacillus II.—No. 18, weight 452 grams.	Œdema Bacillus II.—No. 19, weight 725 grams.	Bacillus of symptomatic Anthrax.—No. 20, weight 377 grams.	Bacillus of malignant Œdema.—No. 21, weight 512 grams.
	° C.	° C.	° C.	° C.
Aug. 26, 1893—				
8:15 a. m.	37·8	38·3	.....	.....
9:15 a. m.	38·3	38·4	40	.....
10:45 a. m.	38·6	39·5	38·9	.....
Inoculated at 11:30 a. m.				
Aug. 26, 1893—				
12 m.	38·5	39·2	38·5	38·7
12:30 p. m.	38·3	39	38·5	38·8
1 p. m.	38·2	39	38·5	38·8
1:30 p. m.	38·2	39	38·5	.....
2 p. m.	38·3	39	39·2	38·8
2:30 p. m.	38·1	39	39	38·7
3 p. m.	38·2	39	39	38·7
3:30 p. m.	38·2	39·1	39·3	38·7
4 p. m.	38·2	39	39·1	38·4
4:30 p. m.	38·2	39·4	39	38·4
5 p. m.	37·7	39·3	39	38·3
5:30 p. m.	37·9	38	38·8	37·7
6 p. m.	37·6	38·2	38·3	37·7
7 p. m.	37·9	38·2	39·2	38·2
8 p. m.	37·6	37·7	39	38
9 p. m.	36·6	37·5	38·5	37·7
10 p. m.	33	37	38·5	.....
11 p. m.	Dead.	36·1	38·8	.....
12 p. m.	.....	35·7	38·8	.....
Aug. 27, 1893—				
1 a. m.	.....	34·4	38·5	.....
9 a. m.	.....	Dead.	38·2	37·5
10 a. m.	.....	.....	.....	37·6
11 a. m.	.....	.....	.....	38·1
12 a. m.	.....	.....	.....	38·6
3 p. m.	.....	.....	.....	38·1
5 p. m.	.....	.....	*38·5	*38·3

* Recovered.

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THE NATURE OF THE GERMICIDAL CONSTITUENT OF BLOOD SERUM.

By VICTOR C. VAUGHAN, M. D., PH. D., and CHARLES T. McCLINTOCK, PH. D.

As early as 1872, Lewis and D. Cunningham* demonstrated the fact that bacteria injected into the circulation rapidly disappear. In the blood of twelve animals, which had been treated with such injections, bacteria could be found in only seven after six hours. In thirty animals bacteria were found in the blood of only fourteen after twenty-four hours, and in seventeen animals bacteria were found in only two when the examination was made from two to seven days after the injection.

In 1874 Traube and Gscheidlent found that arterial blood taken under antiseptic precautions from a rabbit, into the jugular vein of which one and one-half cubic centimeters of a fluid rich in putrefactive germs had been injected forty-eight hours previously, failed to undergo decomposition for months. These investigators attributed the germicidal properties of the blood to its ozonized oxygen. Similar results were obtained by Fodor‡ and by Wysokowicz.§ The latter accounted for the disappearance of the germs not by supposing that they were destroyed by the blood, but that they found lodgment in the capillaries.

The first experiments made with extra-vascular blood were conducted by Grohmann,‖ under the direction of A. Schmidt, in his researches upon the cause of coagulation. It was found that anthrax bacilli, after being kept in plasma, were less virulent, as was demonstrated by their effect upon rabbits. Grohmann supposed that in some way the bacteria were influenced by the process of coagulation.

In 1887¶ Fodor made a second contribution to this subject, and in this he combatted the retention theory of Wysokowicz. One minute after the injection of one centimeter of anthrax culture into the jugular vein, in eight samples of blood, Fodor found only one colony of the bacillus. Then he took the blood from the heart with a sterilized pipette and added anthrax bacilli to it. This was kept at 38° C., and plates made from time to time showed a rapid diminution of the number of germs, which, however, after a time, when the blood had lost its germicidal properties, began to increase.

In 1888 Nuttal,** working under the direction of Flügge, used defibrinated blood taken from various species of animals, rabbits, mice, pigeons, and sheep, and found that this blood destroyed the bacillus anthracis, bacillus subtilis, bacillus megaterium and staphylococcus pyogenes aureus when brought in contact with them. He also confirmed the further finding of Fodor that after awhile the blood loses its germicidal properties and becomes a suitable culture medium in which the germs grow abundantly.

Nissen†† continued this work under Flügge's direction, and reached the following conclusions: (1) The addition of small quantities of sterilized salt solution or bouillon to the blood does not destroy its germicidal properties. (2) Cholera germs and Eberth's bacilli are easily destroyed by fresh blood. (3) For a given volume of blood there is a maximum amount of bacilli which can be destroyed. (4) Blood whose coagulability has been destroyed by the injection of peptone is still germicidal. (5) Blood, in which coagulation is prevented by the addition of twenty-five per cent of magnesium sulphate, has its germicidal properties decreased. (6) Filtered blood plasma from the horse is germicidal.

Behring†† has attributed the action of the blood serum of the white rat on anthrax

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*Eighth Annual Report of the Sanitary Commission of the Government of India.

†Schlesische Gesellschaft f. vaterland. Cultur, 1874.

‡Archiv f. Hygiene, B. 4.

§Zeitschrift f. Hygiene, B. 1.

‖Ueber die Einwirkung des zellenfreien Blutplasma auf einige pflanlziche Mikroorganismen, Dorpat, 1884.

¶Deutsche medicinische Wochenschrift, 1887.

**Zeitschrift f. Hygiene, B. 4.

††Zeitschrift f. Hygiene, B. 6.

bacilli to the unusual alkalinity of the blood of the animal. He has made a number of titrations by which he shows that the blood serum of the white rat is somewhat more alkaline than that of certain animals which are more susceptible to anthrax, such as the rabbit, guinea pig, and cow. His deduction is not justified, because there are many other and more important points in which these animals differ more markedly from the white rat than in slight differences in the alkalinity of the blood serum. Had he shown that the blood of the adult rat, which is not susceptible to anthrax, is more alkaline than that of the young rat, which is susceptible, his argument would have been more plausible; but even then it would not have deserved the dignity of positive evidence.

In 1890 Buchner,* aided by Voit, Sittmann, and Orthenberger, made a most valuable contribution to our knowledge of the germicidal properties of blood. The results of this work are stated as follows:

(1) The germicidal action of blood is not due to phagocytes, because it is not influenced by the alternate freezing and thawing of the blood by which the leucocytes of the rabbit are destroyed.

(2) The germicidal properties of the cell-free serum must be due to its soluble constituents.

(3) Neither neutralization of the serum, nor the addition of pepsin, nor the removal of carbonic acid gas, nor treatment with oxygen have any effect upon the germicidal properties of the blood.

(4) Dialysis of the serum against water destroys its activity, while dialysis against 0·75 per cent salt solution does not. In the diffusate there is no germicidal substance. The loss by dialysis with water must be due to the withdrawal of the inorganic salts of the serum.

(5) The same is shown to be the case when the serum is diluted with water and when it is diluted with the salt solution. In the former instance the germicidal action is destroyed, while in the latter it is not.

(6) The inorganic salts have in and of themselves no germicidal action. They are active only in so far as they affect the normal properties of the albuminates of the serum. The germicidal properties of the serum reside in its albuminous constituents.

(7) The difference in the effects of the active serum and that which has been heated to 55° C. is due to the altered condition of the albuminate. The difference may possibly be a chemical one (due to changes within the molecule) or it may be due to alterations in mycelial structure. The albuminous bodies work upon the bacteria only when the former are in an active state.

We wish at this point to call attention to an inconsistency between the results obtained by Buchner and the conclusions which he draws. In experiment No. 45 he renders the serum slightly acid and adds 0·1 gram of pepsin to each 5 c. c. of serum (showing by a side experiment that this pepsin actively digests coagulated egg albumin in neutral solution) and finds that the digestive action of the pepsin does not lessen the germicidal properties of the serum. In fact, he states this in his conclusions, but his ultimate opinion, and the one held by him in his latest contribution is that the germicidal constituent of the blood is the serum albumin. How much serum albumin remains in blood serum after it has been thoroughly digested with pepsin? He could scarcely have chosen a more positive method of demonstrating that the germicidal constituent is not serum albumin. Either his pepsin was not active, and on this supposition his experiment is without value, or the active constituent of blood serum is a substance which is not destroyed or materially altered by peptic digestion. We know that the peptones not only have no germicidal properties, but belong to that class of proteids which is most favorable to the growth and development of germs. We recognize this fact when we add peptones to the various artificial media on which we cultivate germs. However, we

*Archiv f. Hygiene, B. 10.

will return to this subject again. At present we will proceed with the literature of the subject.

The successful researches of Buchner led many other investigators to enter this field of experimentation, and some of them have made valuable contributions to our knowledge of the germicidal action of the blood under varying conditions, but so far as the nature of the germicidal constituent is concerned but little or no progress has been made. Prudden* found that ascitic and hydrocele fluids restrain the development of certain germs. Rovighi †reported that the germicidal action of the blood is increased in febrile conditions. Pekelharing ‡inclosed anthrax spores in bits of parchment and introduced them under the skin of rabbits. Thus treated, the spores soon lost their virulence and finally their capability of growth. The destruction of these spores could not have been due to phagocytes, which did not penetrate the parchment, but must have been caused by soluble substances.§ Behring and Nissen found that the serum of the white rat, dog, and rabbit destroy anthrax bacilli; while serum obtained from the mouse, sheep, guinea pig, chicken, pigeon, and frog have no such action. It will be observed from this that there is no constant relation between the germicidal action of the blood of animals of different species and their susceptibility to the disease caused by the germ. Thus, the rabbit is highly susceptible to anthrax, notwithstanding the fact that its blood destroys large numbers of these germs. On the other hand, the chicken is immune to anthrax from the moment when it comes from the shell, and yet the bacillus anthracis grows luxuriantly in the extra-vascular blood of the chick. This demonstrates that there is a great difference between the action of extra-vascular blood and that circulating in the body and constantly fed, and, in case there may be need, altered in composition by certain glands.

Halliburton has prepared from the lymphatic glands a globulin which he designates as cell globulin 3, and which agrees with fibrin ferment in inducing coagulation in plasma. Hankin has tested the germicidal properties of this cell globulin. His experiments have been conducted in the following manner: The lymphatic glands (in later experiments the spleen also) of a dog or cat are freed as much as possible from fat and connective tissue, then finely divided and extracted with dilute solution of sodium sulphate (one part of a saturated solution to nine parts of water). The cell globulin passes into solution while the other proteids are but sparingly soluble. After twenty-four hours the fluid is filtered and mixed with an excess of alcohol. The voluminous precipitate containing the cell globulin is collected on a filter and washed with absolute alcohol. For use, a part is dissolved in water and a small quantity of a bouillon culture of the anthrax bacillus is added. Plate cultures are made along with control plates from time to time, and in this way the germicidal properties of the substance is demonstrated.

Hankin‖ closes this contribution with the following conclusions: (1) Halliburton's cell globulin 3 has marked germicidal properties. (2) In this respect it differs from fibrin ferment. (3) The germicidal properties of this substance seems to be identical with that of serum as described by Buchner, Nissen, and Nuttal. (4) The active properties of the serum are probably due to this or an allied body.

Bitter¶ has repeated the experiments of Hankin, but fails to confirm them. Bitter states that he has followed Hankin's directions exactly. However this may be, it is certain that the spleen contains a germicidal substance, but whether it can be extracted by the method of Hankin or not we do not know. That the germicidal constituent of the spleen is identical with Halliburton's cell globulin or with any other globulin we very much doubt. It certainly is a nuclein and it is altogether possible that Hankin obtained traces of this nuclein in his extracts. In this case the extract would show, or fail to show, germicidal properties according to the

*Medical Record, 1890.
†Atti della Accad. Med. diR oma, 1890
‡Ziegler's Beitraige, B. 8.
§Zeitschrift f. Hygiene, B. 8.
‖Centralblatt f. Bakteriologie, B. 9.
¶Zeitschrift f. Hygiene, B. 12.

relative amounts of nuclein and other substances present. The less globulin and the more nuclein present the more marked would the germicidal effect be.

Christmas* has prepared a germicidal substance from the spleen and other organs by the following method:

The animal is killed with ether, opened under antiseptic precautions and the organ removed, cut into fine pieces, covered with 50 c. c. of glycerine and allowed to stand for twenty-four hours, then filtered. The filtrate is precipitated with five times its volume of alcohol, and this fluid immediately decanted. The precipitate is washed with absolute alcohol in order to remove the glycerine. Then the traces of alcohol are removed by pressure and the precipitate dissolved in 25 c. c. of distilled water. Through this solution air is driven for some hours in order to destroy the last traces of alcohol. Then the fluid is filtered and its germicidal action tested. Bitter has also examined this method, and the impartial reader must see that he has not done so with fairness. However, this fact renders the work all the more valuable, because his results confirm the statements of Christmas. Bitter killed his animals by venesection, and, in some cases at least, prepared the substance in unsterilized vessels; but even when this was done the solution was germ free and manifested marked germicidal properties. Bitter finally finds a difference between this substance and the germicidal constituent of blood serum; the latter, he states, is certainly destroyed by a temperature of 65°, while the solution of Christmas, after having been heated to this temperature, is still able to destroy from 35,000 to 40,000 typhoid bacilli within four hours. Buchner† in his latest contribution on the subject has the following to say in condemnation of Christmas:

A method given by Christmas for the preparation of germicidal solutions from the organs of normal rabbits has also been tested by Bitter. Germicidal solutions were indeed obtained, which, however, differed materially from active serum, for in three experiments, notwithstanding heating to 65°, the germicidal action remained.

It is altogether possible that the more powerful action of the solution made by Christmas is due to the fact that it contains the germicidal substances in more nearly a chemically pure condition than it exists in blood serum. It is also highly probable that the cause of the arrest of the germicidal activity of blood serum by a temperature of 55° is not due to the destruction of its germicidal constituent, but is due to the action of the heat on other constituents of the fluid.

Some attempts have been made to determine the nature of the germicidal constituent by the action of precipitating reagents on the proteids of blood serum. In his latest contribution Buchner states that he has not been able to obtain a germicidal solution by precipitating all the proteids with absolute alcohol, freeing the precipitate from alcohol, drying it, and then redissolving. He does not give the methods employed in freeing the precipitate from alcohol, the temperature or conditions under which it was dried or the nature of the menstruum by which resolution was effected. In the absence of these needed details, his conclusion that alcohol destroys the germicidal substance must remain open to question. On the other hand, Christmas states that when the proteids are precipitated with alcohol and the precipitate dissolved in a volume of water equal to that of the original serum, the solution thus obtained has a more powerful germicidal action than the serum. Bitter,‡ in an experimental review of the statement of Christmas, gives the following detailed statement of one experiment:

Ten cubic centimeters of serum were poured into 50 cubic centimeters of alcohol (strength of alcohol not given), stirred, and the precipitate immediately separated from the alcohol by filtration. (He fails to state whether or not sterilized filter paper was used.) The precipitate was freed from alcohol by pressure between folds of filter paper (again he fails to state whether or not this paper was sterilized), then dried at 37°, and mixed with 10 cubic centimeters of sterilized distilled water. On being allowed to stand for a short time at 37° nearly all of the precipitate was redis-

* Annales de l'Institut Pasteur, T. 5.
† Archiv f. Hygiene, B. 17.
‡ Zeitschrift f. Hygiene, B. 12.

solved. The solution was then separated from the deposit by filtration (through unsterilized filter paper?) and tested.

It can scarcely be a matter of surprise that Bitter found germs nearly always present in the solution obtained in this careless manner. However, he did find that the germs present did not develop when the solution was kept at 37° and, moreover, that germs added to this solution were destroyed. Bitter concludes that in truth anthrax and typhoid bacilli are destroyed by "precipitated serum," but not so energetically as by normal serum.

Emmerich, Tsuboi, Steinmetz and Löw* have made interesting and valuable contributions relating to the effect of precipitation of the proteids upon the germicidal action of blood serum. An active serum was dialyzed in a sterilized parchment paper tube against water for from twelve to eighteen hours. By the expiration of this time the serum globin, becoming insoluble on account of the withdrawal of inorganic salts, was deposited. The dialyzer was dried with sterilized filter paper and the globulin-free serum was precipitated with several volumes of alcohol. The precipitate was collected on a sterilized falten-filter and the alcohol removed from the precipitate by sterilized porous plates and filter paper. The precipitate was then finely divided, dried for half an hour in vacuo at 36°, then rubbed up in a sterilized mortar and dissolved in sterilized water to which salt solution had been added. In the solution thus prepared germs did not show, after from three to four hours, either a marked increase or decrease, but when the solution was heated to 100°, allowed to cool, and then inoculated with germs, the increase was four hundredfold within four hours. Next, it was found that if instead of water, a 0·05 per cent aqueous solution of potassium hydrate was employed in dissolving the alcoholic precipitate in the globulin-free serum, this solution possessed all the germicidal strength of the original serum. The same was found to be true of dilute alkaline solutions of the alcoholic precipitate in serum from which the globulin had not been removed. The dilute alkali was shown not to have any germicidal action in and of itself.

From these experiments, the above mentioned investigators conclude that the germicidal constituent of blood serum is an alkaline compound of serum albumin. They also found that heating the serum-albumin alkaline solution to 65° or higher destroyed its germicidal action, and they explain this effect of heat on blood serum and on their artificial solution by supposing that the high temperature breaks up the combination of the alkali with the serum-albumin. Furthermore, they found that a serum which had been rendered inactive by a temperature of 55° could be regenerated in part at least by the addition of the small amount of alkali mentioned above.

Since Fodor† and Zuntz‡ have shown that freshly drawn blood rapidly decreases in alkalinity on standing in vitro, an explanation of the fact that blood serum rapidly loses its germicidal properties naturally suggests itself. Emmerich and his coworkers confirm their belief in this theory by demonstrating that blood serum which has been rendered very feebly acid (0·67 part of sulphuric acid per mille) has no germicidal action, but furnishes a good culture medium.

The above mentioned investigations are very valuable inasmuch as they show the important role which the small amount of alkali plays in the germicidal action of blood serum. This had, indeed, already been demonstrated by Fodor† by quite a different line of investigation. This experimenter had found that the resistance of rabbits to anthrax is markedly increased by the administration by stomach or subcutaneously of sodium phosphate, carbonate or bicarbonate or of potassium carbonate.

Löw concludes that the introduction of alkali into the albumin molecule increases its lability and he cites examples from organic chemistry in support of this view.

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* Centralblatt f. Bakteriologie, B. 12.

† Centralblatt f. Bakteriologie, B. 7.

‡ Centralblatt f. Med. Wissenschaft, 1867.

There are some additional points of interest in the theory of Emmerich and his assistants. As has been stated, they believe that the serum-albumin is the germicide, but they think it highly probable that only a comparatively small part of the albumin is active and this small part, they suppose, originates in the albumin of the daily food, which is converted into lymph cells, and by the disintegration of these it passes into solution in the blood. They admit, however, that there are some reasons for believing, with Buchner, that the whole of the serum-albumin is active. They state that it is possible, but highly improbable, that the germicidal agent is not the serum-albumin, but some substance which is precipitated along with this by alcohol and other agents.

We hope to show that the germicidal agent is not serum-albumin, and that this "highly improbable" substance does exist.

In a short and somewhat unsatisfactory review of the report of Emmerich and his coworkers, Buchner* devotes himself to a consideration of the question of the regeneration of serum rendered inactive by heating to 55° on the addition of an alkali. He details one experiment made by himself on this point. The experiment confirms the work of Emmerich, but Buchner offers an interpretation which is wholly theoretical and by no means convincing. He finds that the regenerated serum when heated to 60° still has a retarding effect upon the growth of germs, and he argues from this that the germicidal action of the "regenerated serum" is due to its being less suited (for some unknown reason) to the growth of bacteria. No one knows better than Buchner the influence of the various chemical substances on the temperature at which an active serum is converted into an inactive form, and yet he overlooks altogether the possible effect of increased alkalinity on this conversion. Had he heated the regenerated serum to 100° he would have then found that it forms a very fertile culture medium.

Hankin* has recently published a paper which is more valuable in its suggestions than in its experimental details. He suggests that the germicidal substance is a special secretion of the eosinophile-granular cells. The granular matter in these cells is, according to his theory, the antecedent of the germicidal substance.

There are many other minor contributions to this subject, but those mentioned above contain all the essential points, and there is no necessity of a further review of the literature. It is true that Aronson† has very recently announced to the Berlin Medical Society that he has isolated a powerful antitoxine from the blood serum of animals rendered immune to diphtheria and that with this substance he has cured guinea pigs infected with this disease. Following the example of another illustrious German investigator, he refuses to tell how this curative substance is prepared. It is needless for me to say that this manner of dealing with scientific investigations has not as yet found favor with the unsophisticated profession in the new world.

From a careful and critical study of the investigations, which have been briefly reviewed, we have come to the following conclusions: (1) The serum-albumin is not the germicidal substance in blood serum. As has been stated, either this must be true or the experiment by which Buchner demonstrated that an active pepsin does not destroy the germicidal action of blood serum must have been an error; because peptic digestion readily and completely converts serum-albumin into peptones and we know that peptones are especially favorable to bacterial growth. (2) The germicidal substance must belong to the proteids. Otherwise it would be difficult to explain the fact that a temperature of 55° renders blood serum inactive. (3) The only proteid likely to be present in blood serum and which is not destroyed by peptic digestion is nuclein.

Having reached these conclusions, the following questions naturally present themselves: (1) Is there a nuclein in blood serum? (2) Has this nuclein, if there be one, germicidal properties? These questions we have attempted to answer.

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*Centralblatt f. Bakteriologie, B. 12. †Berliner klin. Wochenschrift, 1893.

Dogs and rabbits were the animals from which the serum was obtained. Healthy animals, which had not previously undergone any experimentation, were selected. The animal was firmly fixed in a holder; the carotid was laid bare under antiseptic precautions. A ligature and a small clamp were applied to the artery about 2 inches apart, the former distally and the latter centrally. Then a slit in the artery was made with a sterilized knife, and a small sterilized glass canula, with sterilized and dried rubber tube leading into a sterilized Erlenmayer flask, was introduced into the artery and held in place by another ligature. Then the clamp was removed and the blood flowed into the flask. In each case the animal was bled to death. The flask containing the blood was placed in the ice chest and allowed to remain for twenty-four hours. By the expiration of this time a wine-colored serum had separated. This serum was poured into a second sterilized flask and about ten volumes of a mixture of equal parts of absolute alcohol and ether were added. This produced a voluminous precipitate which was nearly white. This was allowed to stand twenty-four hours, and in some cases much longer, the alcohol and ether being decanted and replaced by equal volumes twice or oftener during the time. Then the supernatant fluid was decanted and an equal volume of a 0.2 per cent solution of hydrochloric acid, containing active pepsin, was added and the flask placed in an incubator at 38°, and the digestion was continued until the fluid failed to respond to the biuret test for peptones.

Each time this test was made the fluid was decanted from the undigested portion and replaced by an equal volume of fresh digestive fluid. In some instances the flask containing this fluid was allowed to stand in the incubator for some days. This was not necessary in order to complete the digestion, but was allowed as a matter of convenience. In all cases the digestion was prompt, and proceeded to a certain point, when it ceased altogether. The undigested portion was small in amount and grayish in color. This was collected on a small sterilized filter, and washed first with 0·2 per cent hydrochloric acid and then with alcohol. After the washing with alcohol the filter was allowed to stand exposed to the air for half an hour or longer in order that all of the alcohol might pass through or evaporate. The precipitate was then dissolved in a sterilized solution of potassium hydrate. The strength of this alkaline solution usually employed was 0·12 per cent. Usually this solution contained, in addition to the alkali, 0.6 per cent of sodium chloride. In some instances a solution, containing 1·2 grams of potassium hydrate, 6 grams of sodium chloride, and 1 gram each of sodium bicarbonate and disodium hydrogen phosphate to 1 liter of water, was employed as a solvent. The solution was filtered through a Chamberland tube and received in a sterilized flask.

The solution obtained as above stated was perfectly clear, colorless, and did not respond to the biuret test. The addition of strong nitric acid produced a cloudiness, which dissolved on the further addition of the acid. This acid solution did not become yellow on being heated, but did so after the addition of ammonia.

We have now answered the first question. Blood serum contains a nuclein. We hope to investigate, at some time in the future, the relation between this nuclein and fibrin ferment.

The origin of the nuclein found now for the first time in blood serum is an interesting question. Does it come from the disintegration of the polynuclear cells, or shall we regard certain white blood corpuscles as unicellular organs whose function it is to secrete this nuclein?

In proceeding to determine whether or not this nuclein has germicidal properties the solution was distributed in sterilized test tubes, five c. c. being placed in each tube. It should be stated that, in dissolving the nuclein, the volume of the solvent employed was in all cases the same as that of the blood serum from which the nuclein was obtained. These tubes were inoculated with different germs and plates made at varying intervals of time in order to test the germicidal action. One and

the same platinum loop was used in the preparation of each plate. The diameter of this loop is 2 millimeters.

EXPERIMENT I.

A nuclein tube was inoculated with the bacillus of Asiatic cholera and plates made from this gave the following results:

Time	Immediately.	5 min.	15 min.	30 min.	1 hr.	1½ hrs.	22 hrs.
Number of colonies	2,100	43	54	71	90	115	1,200

That the alkali in which this nuclein was dissolved did not cause the decrease in the number of germs is shown by the subsequent increase.

EXPERIMENT II.

Staphylococcus pyogenes aureus.

Time	Immediately.	1 hour.	4 hours.	7 hours.	24 hours.
Number of colonies	4,000	1,720	1,050	810	0

EXPERIMENT III.

Anthrax bacillus without spores.

Time	Immediately.	1 hour.	4 hours.	7 hours.	24 hours.
Number of colonies	100	43	10	1	0

EXPERIMENT IV.

Cholera germ.

Time	Immediately.	1 hour.	4 hours.	7 hours.	24 hours.
Number of colonies	470	45	1	0	410

It may be stated here that the final increase in the number of cholera germs occurred both in the nuclein solution prepared from the serum of the rabbit and that of the dog.

EXPERIMENT V.

Staphylococcus pyogenes aureus.

Time	Immediately.	1 hour.	5 hours.	19 hours.	24 hours.
Number of colonies	Countless.	22,000	12,525	155	0

EXPERIMENT VI.

Anthrax bacillus without spores.

Time	Immediately.	1 hour.	5 hours.	19 hours.	24 hours.
Number of colonies	1,120	155	0	0	0

All of the foregoing experiments were made with the solution of nuclein in sterilized water containing 0·12 per cent potassium hydrate and 0·6 per cent of sodium chloride. The following were made in the other solution mentioned above. It may be stated that the culture of the aureus experimented with grew in water containing 0·5 per cent of potassium hydrate.

EXPERIMENT VII.

Staphylococcus pyogenes aureus.

Time	Immediately.	1 hour.	4 hours.	7 hours.	24 hours.
Number of colonies	5,000	2,500	1,600	1,200	0

EXPERIMENT VIII.

Anthrax bacillus without spores.

Time	Immediately.	1 hour.	4 hours.	7 hours.	24 hours.
Number of colonies	43	7	0	0	0

EXPERIMENT IX.

Cholera bacillus.

Time	Immediately.	1 hour.	4 hours.	7 hours.	24 hours.
Number of colonies	350	105	150	42	0

EXPERIMENT X.

Staphylococcus pyogenes aureus.

Time	Immediately.	1 hour.	5 hours.	19 hours.	24 hours.
Number of colonies	Countless.	25,000	5,525	65	500

EXPERIMENT XI.

Anthrax bacillus without spores.

Time	Immediately,	1 hr.	5 hrs.	19 hrs.	24 hrs.
Number of colonies	430	0	0	0	0

We have made many other tests of the germicidal action of this nuclein obtained from blood serum, but, since all of them gave practically the same results, further repetition is unnecessary.

We have also made many experiments on the effect of heat and other agents on the germicidal action of this nuclein, but we prefer to report these later, since we have obtained some unexpected results. Suffice it to say that while boiling destroys the germicidal action, the temperature to which these solutions may be heated and still show some retarding action on germs has surprised us.

The fact that the germicidal constituent of blood serum can be isolated has an important practical bearing. Blood-serum therapy has proven impracticable on account of the large amount of the fluid which must be injected. Now, nuclein therapy promises to enable us to avoid this difficulty, and possibly the near future may find us using this agent in the treatment of disease. The nuclein may be obtained from an animal rendered immune to diphtheria and a sufficient quantity of this injected into the blood or under the skin of a child suffering with this disease may effect a cure, but we will not prophesy. The future will tell us what it has in store when it becomes the present.

VASOMOTOR ATAXIA: A CONTRIBUTION TO THE SUBJECT OF IDIOSYNCRASIES.

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The present paper is intended merely as a record of personal observations, and presentation of conclusions based thereon; it will not, therefore, refer to facts and theories in literature, though many observations parallel with, and confirmatory of, the views expressed have been found. The exigencies of time necessitate citation of a few only of the cases studied, which, excluding the more numerous instances of slight departure from the norm, altogether number sixty-odd, accumulated in hospital and private practice during the course of some eight years; and such reports as are made must be brief. I would request, therefore, that it be assumed, in discussion, that despite brevity of account these cases have been investigated from all standpoints, with as much thoroughness as I am capable of, or as the opportunities permitted.

The varying susceptibilities of different individuals, and of the same individual at different times, to the same influences has long been a matter of every-day obser-

vation. Of a number of persons exposed to cold and wet at the same time and place, one shall have articular rheumatism, another pneumonia; one shall contract tonsillitis, another nephritis; others shall escape apparently unharmed. Evidently there is something at work in addition to inclement weather and specific microbes; and this something, which is the determining and, therefore, the principal etiologic factor, is a something special to the individual—a physical personal equation. We call it, whether exhibited in relation to the exciting causes of disease or to the action of drugs, individual liability, predisposition, idiosyncrasy; and though our terms are singular in type, we recognize that the singularity is relative and may be exhibited by several persons.

For every idiosyncrasy there must be a physiological basis. By comparing the phenomena, special and general, exhibited by a group of persons presenting similar or identical idiosyncrasies, we take a step toward the recognition of the basic physiological conditions.

I would invite the attention of the section to-day to an idiosyncrasy of the circulatory mechanism, which, in its extreme degrees, manifests itself in the form of well-recognized symptom-complexes; in its minor degrees gives rise to puzzling manifestations of great variety of detail; and in its least-developed forms often passes unnoticed. For this condition—which seems to depend upon a feebleness in the coordinating mechanisms, in consequence of which the balance of the cardiovascular action becomes disturbed by influences that in the great majority of persons have no such effect, and greatly disturbed by influences that normally have slight effect, while the restoration of equilibrium is slow and imperfect—I would propose the self-explanatory name of *vasomotor ataxia:* ataxia rather than hyperkinesis, or hypokinesis, because excessive vascular dilatation and excessive vascular constriction may be either spasmodic or paretic, or both spasmodic and paretic, as dilator or constrictor nerves, or both, are affected; and even in the extreme and opposite types of vasomotor ataxia, the phenomena, while always more or less paroxysmal, are neither exclusively those of dilatation nor exclusively those of constriction, but both abnormal dilatation and abnormal constriction are usually present in varying degree in the same patient. The influences under which these phenomena are displayed are, more especially, temperature—and cold more than heat—emotion, visceral or internal reflex excitation, and the action of toxic agents formed in the organism or introduced from without.

The most striking and easily recognized phenomena are those exhibited by the heart and by the peripheral vessels (arterioles, capillaries, and venules); but analogy indicates that similar manifestations occur in the vessels of glands and viscera, while certain symptoms are only to be explained by disturbance of cerebral circulation. The stimulus that results in cardiac and vascular disorder may be applied centrally or peripherally, but the defective inhibition upon which the phenomena depend must be relatively central, and is probably the expression of functional or nutritional defect in the great ganglia of the sympathetic system, or in the medullary centers, or in both.

Functional and nutritional disturbance may result in structural, and finally in organic change; but the discovery of gross anatomical change at necropsy would not prove that it had existed from the first. It is likewise to be borne in mind that functional, nutritional, or structural defect in the sympathetic ganglia or nerves may be primary, or the result of primary or secondary disease elsewhere. Furthermore, as a result of disturbed innervation and consequent malnutrition, degenerative changes may take place in the vessel walls and in the myocardium. The phenomena of vasomotor ataxia may thus occur independently, or be merely a part of the symptomatology of functional and organic diseases of various kinds. In either event the mechanism is essentially the same, and it will facilitate study to consider the circulatory symptoms apart from other and complicating conditions.

With the pronounced types of vasomotor ataxia, to which at the one extreme—

that of vascular relaxation—the name of Graves's disease or exophthalmic goiter, and at the other extreme—that of vascular tetany—the name of Raynaud's disease, local syncope, local asphyxia, acroasphyxia, symmetrical gangrene, acrosphacelus, etc., have been given, all are familiar. All are familiar, too, with the association of other phenomena of vasomotor paresis or vasomotor spasm; with Graves's disease and with Raynaud's disease. For example, angina pectoris occurs in both, and angioneurotic œdema and spontaneous gangrene have been observed in Graves's disease. As pointing toward more than a superficial or accidental resemblance in such association of the two affections, the following two cases are submitted:

Case I. Acro-asphyxia, with intermittent enlargement of thyroid gland, and paroxysmal tachycardia.*—Sarah O'N., unmarried; seamstress; aged 25 years; native of Ireland; having fair skin, brown eyes, black hair; was seen at the Philadelphia Polyclinic, April 11, 1892. For three or four months she has had almost constant headache, with occasional dizziness. Vision at times misty. The feet sometimes swell. At times she has pain in the precordium, with cardiac palpitation. These attacks occur paroxysmally. For about two years she has noticed that several times a day, especially if exposed to cold, either by immersion in cold water or otherwise, the fingers suddenly become discolored—purplish. Both extremities are affected at once. The discoloration begins in the palm of the hand and extends downward. It lasts but a few minutes, and disappears quickly. The first phalanx of the middle finger of the right hand is thickened, the skin glossy, the veins much distended. There is a depressed cicatrix on its inner aspect. The patient states that twelve years ago there was a swelling at this place, which was lanced, and kept on discharging until within a few months, when the sinus finally closed. The bowels are constipated. The patient does not rise at night to micturate. Menstruation is irregular. Examination shows all over the arms mottled areas of irregular distribution, indicating by their varying color, and by the appearance of the distended vessels, both capillary and venous congestion. Over the upper part of the chest, anteriorly and in the back, especially beneath the scapulæ, are congeries of distended superficial venules. The legs and feet appear not to be affected. No lesion of the lungs can be detected. At the first examination of the heart the rate is 96. At the base a soft systolic murmur is heard, more distinctly on the left. In the veins of the neck a marked musical hum is heard, louder on the right. It is continuous, with systolic intensification. The thyroid gland is easily demonstrated, but not markedly enlarged. Hæmoglobin is 65 per cent by Fleischl's scale; red corpuscles number more than 4,000,000; there is no excess of white cells. Urine is 1018, acid, no albumin, no sugar, no casts, no red cells (Dr. Eshner). The fundus of the eye is normal; there is compound hyperopic astigmatism (Dr. Jackson).

Relief of constipation, together with correction of visual error by glasses, apparently relieved the headache. After a few doses of nitroglycerin, the local asphyxia did not return while the drug was taken.

Some three months later the patient returned, complaining of recurrent headache, with attacks of precordial pain and violent palpitation. The nature of these attacks seemed to be that of tachycardia rather than simple palpitation. While under examination the pulse rate was variable, about 130. The thyroid gland was slightly enlarged, and a bruit could be heard over the gland on auscultation.

Picrotoxin, $\frac{1}{50}$ grain t. d., was prescribed, with apparent relief to headache. During some ten weeks the thyroid was observed to enlarge and diminish irregularly, without reference to menstruation, which occurred twice during the period. The swelling was soft, not expansile, and greatest on the right side. The patient was last seen some four months ago, when the thyroid gland was apparently normal; pulse-rate 96.

Case II. Epilepsy; acroasphyxia; enlargement of thyroid gland.—Mary N., aged nineteen years; domestic, unmarried; of American birth, Irish parentage; fair skin, brown hair, blue eyes; seen at the Philadelphia Polyclinic, January 4, 1893, has had mild epileptic paroxysms of about one-half hour's duration once a week since the preceding October. There is no aura. She screams and turns pale before losing consciousness. The bowels are regular; the menses regular but painful. The patient is subject to paroxysmal flushing, with subjective and objective heat, especially of the face. There are irregular sweats. She has urticaria in summer time. She is easily excited; and has frequent attacks of palpitation and rapid thumping of the heart. The heart is not enlarged; the impulse is jerky; the rate is 100; the first sound is short, the second sound is accentuated at the aortic cartilage and at midsternum. There is a soft systolic murmur over the sternum, near the articulations of the second cartilages; it is not transmitted. The thyroid gland is enlarged, especially in the right lobe; it is soft and pulsating; there is no thrill and no bruit.

* *Vide* The Philadelphia Polyclinic. June, 1892, p. 89.

The hands are of a dusky-blue color, which slowly fades on elevation; the nails are purplish. Upon immersing the hands in ice-cold water they soon become red. If one hand only is placed in the cold water, that one becomes red, the other a deeper blue. Dermographism is marked. Factitious urticaria is produced by pressure, followed by cold.

The patient states that only recently has she noticed occasional blueness of the hands; that it is not constant, and is usually produced by cold, but may come on while at work in a warm room.

There are on the cheeks of this patient three or four small reddish elevations, surrounded by little radiating lines—a star, as it were—of dilated vessels. A number of small telangiectases are found on the arms and breast. She states that she bleeds easily if cut, but blood is stanched in a reasonable time. She frequently bleeds from the nose. No family history is attainable.

Taken by themselves, these two cases might not appear to be of special significance; but to me they were of great interest, because they seemed to supply the links between two groups of cases that had occupied my attention for a number of years, and which I believed to be related to each other, as to Graves's disease in the case of the one group, and to Raynaud's disease in the case of the other group; and thus to complete the chain of observation, as of reasoning. This will become more apparent if I relate briefly, but in some detail, the case that first drew my thoughts to the subject.

Case III.—In February, 1885, Miss X., of American birth and parentage, Hebrew race; fair complexion, brown hair, gray eyes; an intelligent and truthful, and not hysterical young lady, some 17 or 18 years of age, apparently in perfect health, was alarmed at a sudden dimness of vision, progressing in the course of a few minutes to total blindness, which lasted "about a second." The return of sight was followed by intense headache, lasting about ten minutes. Ophthalmoscopic examination, some hours afterwards, and at different times since, has never detected any abnormality.

Examination of the urine, passed the morning following this attack, showed the presence of a quantity of albumin too slight to be quantitatively estimated, a few leucocytes, a few uric acid crystals, many red blood-cells, and in one or two fields a hyaline tube-cast, or a mucous cast. This condition lasted for two or three days. The urine was acid in reaction, and 1015 to 1018 specific gravity; the quantity was normal. Inquiry revealed the fact that the patient blushed easily, and that in addition, without known emotional cause, there occurred at times what she termed "burning flashes," in which the skin at various areas, sometimes circumscribed, as to a cheek, sometimes generalized, would for a few minutes, or a few hours, become intensely red, and with both subjective and objective sensation of heat. On one or two occasions the peculiar distribution of the red areas and their persistence for a day, had led to a false domestic diagnosis of measles. But the repetition of the attacks, their peculiar development and course, and the absence of all other morbid phenomena, soon proved the error. As a child, too, she was said to have had measles three times and rubella once. In one of these attacks that I saw, as the rash was fading, the skin of the arms, chest, and neck was covered with little pink spots, not elevated above the surface, the largest of which was no larger than an ordinary pin-head; and I was told that the rash began in the same way, but that when at its height it presented either a uniform scarlet flush or the mottled appearance simulating measles. On another occasion I saw the patient when the right cheek was the seat of a vivid blush, the left being apparently normal, and was told that the left cheek had been the blushing one some hours earlier. The flushed right cheek had a surface temperature of 97° F., the left cheek 95° F., while the axillary temperature was 98·4° F.

Over the middle portion of the left lower jaw this patient's skin invariably presents during menstruation an area of fixed blushing; that is, it is reddened in an oval patch about two inches long and half an inch wide, the color being deepest in the center, and fading at the periphery into that of the surrounding skin. Her nails are slightly convex, pink in color, longitudinally striated, and exhibiting crescentic markings. She has been under observation continuously since the attack of blindness recorded, and during that time has presented, in addition to the flushes spoken of, an attack of erythema nodosum; several attacks of urticaria; one attack that I did not see, which appears from her description to have been a circumscript œdema of the arm; and one that I did see, which was circumscript œdema of the calves of the legs. The transient blindness has been repeated, affecting only one eye, however, and there was one attack of hemiopia, likewise transient, in which she did not determine which eye was affected, or whether both were involved. In 1889 an attack occurred, which (my notes being defective) she describes as follows:

"Having been in good health for two years, I awoke one night with a great desire to urinate; this was followed by a feeling of faintness and great pain in the heart—I must have been partly unconscious, as I walked down stairs without remembering how. When I became aware of my surroundings, there was intense itching of the palms of the hands and soles of the feet, and a trembling of the whole body, which, for some minutes, I was unable to control. In the morning there was a red-blotchy appearance on the chest, lasting several hours, and welts on the wrists. I felt well, and had no pain. I remember that the urinalysis for the next six months frequently showed albumin, but I felt perfectly well and strong. The rash and welts occasionally appeared."

The urine is for months normal, but occasionally shows a trace of albumin, uric acid crystals, casts, cylindroids, or hæmocytes. Sometimes all of these will be found together, sometimes albumin only, or blood cells only. General health and strength keep good; the eyes are emmetropic (Dr. Jackson), with large pupils, and the blood is normal. Though there are occasional attacks of palpitation, the heart and, so far as I can determine, the lungs and all the other viscera—for I do not believe there is organic renal disease—are normal. Menstruation, however, is irregular at times, and there is occasional dysmenorrhœa. The attacks described are not related with menstruation. The thyroid gland is demonstrable, but not enlarged.

The family history in this case is of great interest. It can hardly be a series of meaningless coincidences. The patient's father died of acute pneumonia, after having for forty years suffered with pulmonary hemorrhages, attributed to "disease of one lung," of what nature I do not know.

Several paternal cousins have leucoderma; one has had renal colic, passing uric acid gravel; another, highly myopic, has obscure symptoms of disturbance of the sympathetic nervous system, diagnosticated by one observer as incipient Graves's disease; another has had chorea, and is very liable to epistaxis and to panaris; another, likewise highly myopic, has had retinal hemorrhage; another has chilblains every winter, and is subject to sudden syncope from slight indigestion; another has blueness of the hands every winter, with tendency to deep fissuring of the finger-tips, unless constantly protected by woolen mittens; another will get circumscript œdema from slight knocks that in others would pass unnoticed, and that even in him do not cause discoloration of the skin. A paternal aunt, still living, is affected similarly to the father. A brother of the father's died at the age of thirty, of suffocation, in the course of a pulmonary hemorrhage. His son has progressive myopia of high type. There is likewise a rheumatic tendency in this family; one of its members has had diabetes mellitus. The patient's mother is living and healthy, at past sixty years of age. Severe mental shock, however, not long ago prostrated her in bed for a few days, during which time the heart's action was feeble, excited, and irregular; the temperature was slightly subnormal; albumin, tube-casts, red and white blood cells were found in the urine. I am satisfied that she has no organic lesion. Several members of her family have had diabetes mellitus, living, however, to advanced age, and two of her sisters and one niece have had carcinoma of the breast. There is also a gouty and a neurotic heredity in this family.

As further exhibiting the essentially constitutional basis of vasomotor ataxia may be briefly stated:

Case IV.—A brother of the preceding patient, aged 35 years, dark-haired, blue-eyed, has been for some eight years the subject of ophthalmic migraine, and has attacks of spasmodic asthma if exposed to the emanations of feathers, or to moist atmosphere at the seashore. He has hyperopic astigmatism (Dr. Gould). His thyroid gland is slightly enlarged. He exhibits along the borders of the ribs the peculiar appearance which I have termed the *costal fringe*, namely, a network of telangiectases, following the outlines of the costal arches. This appearance is found in some cases of hepatic cirrhosis, but this patient's liver is apparently normal. He has no pulmonary or other visceral lesion, but is seized at times with gastric crises (pain relieved by vomiting), that appear to correspond with periods of lithuria and oxaluria. His urine has never shown albumin or casts; and red blood-cells have been found on but one occasion. His reflexes are normal, or perhaps slightly exaggerated.

These two patients, and a sister of theirs who is subject to profuse epistaxis,

occurring without apparent cause, but is otherwise healthy, exhibit three symptoms upon which I would lay special stress:

1. *Dermographism.*—That is to say if, with a blunt probe, and using very light pressure, letters or other device be traced upon the skin of the patient, especially upon the inner aspect of the limbs, or over the sternum, the tracings soon appear in a rosy-red tint that lasts for some minutes, or even half an hour.

2. *Factitious urticaria.*—If in tracing upon the skin, one uses a little deeper pressure than before, the red lines soon broaden, and finally the reddened portions show a more or less decided elevation, like the wheals of urticaria. In some cases the red color fades, in others it persists. The elevation remains in some instances, notably in cases of chorea and of exophthalmic goiter, for several hours. When factitious urticaria is not immediately apparent upon the use of pressure merely, it may in some cases be quickly developed by applying cold to the part, as with a lump of ice; in other cases the application of hot water will cause it to appear. When cold or heat is applied, the wheals are always reddened, and sometimes a diffuse redness that slowly fades is likewise seen upon the intervening skin.

3. *A modified form of Stellwag's eye-sign of exophthalmic goiter.*—When the patient looks fixedly before him, and opens the eyes, a distinct white rim of sclera is exposed above the cornea. It may be spontaneously exhibited in the excitement of conversation, or may have to be developed by the physician in the course of examination.

I lay stress upon these signs on account of their occurrence in Graves's disease. Unfortunately I have not been systematically employing these tests for much more than a twelve-month, during which time I have not seen a large number of typical cases of exophthalmic goiter. I have records, however, of seven undoubted cases (one male, six females), in which dermographism and factitious urticaria were marked; and, indeed, I have never seen factitious urticaria so readily produced, so persistent, or so striking, as in the case of a colored woman with exophthalmic goiter, in the wards of one of my colleagues at the Philadelphia Hospital. I may briefly record in this connection, as a case linking the preceding ones with those to follow, a case from my own service at that hospital.

Case V. Exophthalmic goiter with acro-asphyxia.—(Notes taken by Drs. Claribel Cone and S. Stivers, resident physicians, Philadelphia Hospital, February 23, 1893.) Charles P., aged 33 years, waiter, native of Ireland, unmarried. His mother died of cancer of the breast; his maternal grandmother, of cancer of the nose; a maternal cousin, of phthisis. There is no neurosis in the family. The patient had the infective fevers of childhood. He has been a hard drinker. He had syphilis and gonorrhœa about twelve years ago. He has not had rheumatism. When a child he had attacks of palpitation of the heart, which ceased as he grew older. Twelve years ago he was occasionally attacked in the same way. Six years ago, after a debauch, more persistent rapid action of the heart developed, and has continued at intervals since. Attacks may be brought on by his being startled. The cardiac disturbance sometimes prevents sleep. It is accompanied with dyspnœa. There is no cough. For the same length of time he has been very nervous, easily frightened; his hands tremble, and at times there is a general tremor. The cardiac storms and general nervousness develop synchronously. He has occasionally spat blood; not sufficient to cause him to give attention to it. The present attack began about a month before admission. There is no pain, no anæsthesia, no motor paralysis. The eyes were always large, but have been getting more prominent for the last two years. Graefe's and Stellwag's signs are both present. Goiter has appeared and disappeared. No data of this are attainable. At present there is no demonstrable enlargement of the thyroid gland. The pulse rate varies from 81, under treatment, to 140 without treatment. The cardiac impulse is not strong. There is no murmur. In the vessels of the neck, especially the jugulars, there is a marked musical hum. Examination of the blood shows: Hæmoglobin (Fleischl's scale), 30 per cent; red corpuscles, 4,036,000; white cells, 11,000. There is no pulmonary lesion. There is nothing abnormal in the urine. The patient has frequent cold sweats. The skin is usually warm and moist. The hands, from time to time, become bluish and cold. They are always moist. At times after an attack of coldness and lividity, they become pink and warm. The attacks are independent of weather and of the temperature of the ward, but can be induced by exposure to cold. The duration is variable. The patient has an irregular temperature but no relation can be traced between temperature curve and paroxysms of acro-asphyxia. Dermographism and factitious urticaria are marked. The hands

immersed in warm water (110° F.), become slightly red in about three minutes. In cold water (40° F.) they become quite red in two minutes. One hand being placed in cold water becomes red; the other, left free, becomes blue. White spots made by pressure on the bluish or reddened skin remain for a long while. Elevation reduces lividity slowly, but has no effect on the pinkish discoloration. The patient exhibits telangiectases at different portions of the trunk, and has a hard, pinkish, sessile growth about the size of a bean, on the left cheek.

Incidentally, it may be remarked that this patient professed to feel better, and exhibited slight objective improvement during the administration of desiccated thyroid gland. The only abnormality observed in the urine was during this time, and consisted in an intense blood-red coloration. It did not respond to tests for hæmoglobin, and Dr. John Marshall kindly examined the specimen, and reported the color to be due to a modified form of indican.

Bearing the foregoing case in mind, the observation now to be recorded finds its place and explanation. The case is in many respects similar to one that I observed in 1886 at the Jefferson Medical College Hospital, and in which Prof. Bartholow concurred in my diagnosis of vasomotor paresis, as against cardiac hypertrophy. In the earlier case acro-asphyxia was not present; temperature was elevated during paroxysms of flushing of the face. There was much headache.

Case VI. Hæmoptysis; tachycardia; acro-asphyxia.—I. H., aged 16 years, of Russian birth and parentage; Hebrew race; dark skin, hair, and eyes; a poor boy, who during the day teaches languages to beginners, and at night, in a cold room, studies to fit himself for college, was sent to me by his attending physicians, Dr. C. D. Spivak, February 26, 1893, with a note stating that for a week he had had daily hemorrhages, slight in amount, believed to be pulmonary, the blood being bright red and sometimes mixed with saliva. There was no cough, no expectoration. Physical examination revealed no pulmonary or laryngeal lesion. The heart was rapid (130) and forcible, but not demonstrably enlarged. The first sound was somewhat short, the second sound accentuated. The pulse was tense. The hands were discolored, the terminal phalanges being of a deep purple, the rest of the fingers and the dorsum of the hand being of various shades of pink, red, and blue, the palms being mottled red and blue. Elevation slightly lessened the color, and secured a more even distribution of shades. The thyroid gland was slightly enlarged, and there was a faint hum in the vessels of the neck. The pupils were widely dilated, and there was evidently great eye-strain; the patient complaining of headaches brought on by reading, and the left eye showing a tendency to wander. Later in the case, Dr. George M. Gould kindly examined the eyes, and found a high degree of compound hyperopic astigmatism; the eye-ground being normal. The urine has never contained albumin or casts, and red blood-cells were found on but one occasion.

The patient was put to bed, with regulation of diet and secretions; ice was applied over the heart, and tincture of aconite given until the pulse fell to 60. In the course of a week he was permitted to rise, when the pulse immediately shot up to 100. Dark glasses and paralysis of accommodation, adopted at Dr. Gould's suggestion, failed to quiet the heart. Suitable glasses were then prescribed, and aconite again administered until the pulse, in a sitting posture, fell to 80. On stopping the aconite, tachycardia again manifested itself. Examination of the urine showed nothing abnormal. Examination of the blood showed corpuscles and hæmoglobin about 75 per cent. The accentuation of the second heart-sound, and the high pulse-tension now received the consideration that perhaps they should have had earlier. Aconite was stopped, and nitroglycerin given in ascending doses until physiological effect was manifested. The pulse-rate fell to 80 in the sitting posture, 90 in the standing position. It was still further increased upon exertion. Aconite was now given in conjunction with nitroglycerin, and tincture of chloride of iron administered concomitantly. Under this treatment, with gradually decreasing doses of aconite and nitroglycerin, the pulse has become steady at about 80. There has been no further hemorrhage. No sign of pulmonary lesion is to be discovered. There has been no history of rheumatism. While in the house, the room being kept warm, the discloration of the hands faded to a light duskiness. While going about in cold weather, the condition previously described returned. The hands sweat profusely at all times, even in cold weather. Since warm weather has set in the hands have become normal in appearance. The patient exhibits dermographism, factitious urticaria, and the eye-sign already described. The pupils are persistently and equally large.

Case VII. Œdematous acro-asphyxia.—The brother of the preceding patient, a peddler, a native of Russia, aged 23 years; is subject to chilblains. I had one opportunity to examine him—July 17, 1893, a warm day. The hands were of a dusky color, mottled red and bluish; the nails purplish, and exhibiting the peculiar cres-

centic markings. There was considerable sweating of the hands; he says that they get almost black in cold weather, and sometimes when not cold. At times they suddenly swell, and are often dark blue when they swell. The swelling lasts a few hours, rarely a day. Sometimes there are white patches on the hands when they are otherwise blue. The duskiness present on the occasion of my examination lessened on elevation. The heart was strong; there was no murmur; pulse 84 in sitting position, somewhat tense.

There was mydriasis; the sclerotic was exposed on opening the eyes. Dermographism and factitious urticaria were present. The hands trembled on being held out for a short time. This was said to be of frequent occurrence. The thyroid gland was not demonstrable. There was no history of cardiac palpitation. This patient likewise has hyperopic astigmatism.

Additional cases might be narrated were it necessary (and some will be published hereafter) in which what we may, for convenience of designation, call the Graves group of phenomena and the Raynaud group of phenomena are mingled in varying degree. But those selected are sufficiently indicative of the gradual transitions by which two diseases, apparently so opposite in their nature, may be brought under one clinical generalization. Leaving, now, the Graves group and those cases that stand on the far side of it, I desire to briefly submit some interesting cases on what we may call the hither side of the Raynaud phenomena; and it will be found, I think, that gradual transitions may also be traced here down to normality, which, like the sigil, completes our ring.

Case VIII. Anæmia; hæmatemesis; gastric ulcer (?); acro-asphyxia.—Mary T., aged 17 years; of American birth and Irish parentage; fair skin, dark hair, gray eyes; syphilitic inheritance; was under my care in 1888 for profound anæmia with hæmatemesis and symptoms suggestive of gastric ulcer, and recovered under treatment based on such a diagnosis. Early last winter she returned, rosy in hue, without anæmia, but again complaining of spitting blood. Her hands were of a deep-blue color, which was unaffected by position. I sent her to a friend to have her hands sketched, and on the way to his office they resumed a normal color. Frequently during the cold weather they would become red or blue, or mottled red and blue. On severe exposure they once became dead white and were excessively cold. When blue the hands are sujectively and objectively cold; when red they are objectively warm, but subjectively cold. The same changes take place in the feet. Both hands and feet sweat profusely. Capillary pulse was seen in the lips and nails. Occasionally she has a film before her eyes. There is no lesion of the eye ground, but glasses are worn for relief of headache (myopic astigmatism, Dr. Jackson). There is no cardiac or pulmonary lesion. The thyroid gland is not abnormal to palpation. The pulse is 80, and of low tension, as shown by sphygmogram. Examination of the blood showed: hæmoglobin, 80 per cent; corpuscles normal. The urine contained a few red corpuscles.

Case IX. Hæmoptysis; tuberculosis; acro-asphyxia.—M. M., a drug clerk, a native of Russia, of fair complexion, light hair, blue eyes, applied at the Philadelphia Polyclinic February, 1893, on account of pulmonary hemorrhages. Attention was attracted to the blueness of his hands. This was said to have manifested itself while out of doors during cold weather for several years, and to slowly fade into a pinkish tint while the patient remained in doors. Elevation caused very gradual disappearance of the discoloration. The heart was normal. There was found slight dullness and crackling at the left apex, and large and small mucous râles over both sides of the chest. After repeated examination of the sputa a few tubercle bacilli were found. The patient stated that his mother's hands were similar to his, as were also those of one sister and one brother younger than himself. His father and his elder brothers and sisters did not exhibit it. The sister and brother who had blue hands were quite subject to bleeding from the nose; with the sister, epistaxis ceased with her first pregnancy.

This patient showed dermographism and factitious urticaria. There was no cardiac lesion and no abnormality of the thyroid gland. His hands and feet were constantly sweating both in hot and cold weather. He had paroxysms of polyuria. His urine while under observation showed occasionally red blood cells, no albumin, no sugar, no excess of urates. He has myopic astigmatism (Dr. Jackson). Under treatment, with rest and calcium chloride, the pulmonary hemorrhages ceased, and the hands improved while kept wrapped in cotton and treated daily with a descending galvanic current.

In these cases of blue hands, and in many others of which I have record, there is a striking series of phenomena to be observed, which I have not thought it necessary to relate in detail in each case. If, during a period of quiescence, that is to

say, in warm weather, or after the effect of treatment, or if the warmth of the room has made the hands somewhat less blue, one hand be placed in ice water it will, in a few minutes, become a bright red, while the other hand, not exposed to local cold, becomes a deep blue. Control observations on normal hands do not show the same result. If, during an attack of local asphyxia, the blue hands be placed in warm water, one of two things may occur: 1st. The hands may quickly become red. In that event, on removal from the warm water the red fades to a dead white, then the normal color returns, then an abnormal blueness. Stroking the hands, either up or down, increases the rapidity with which the whiteness develops—and in some few mild cases, stroking alone, without resorting to immersion in cold water, will produce it. 2d. In other cases the hands become white on immersion in warm water, and red or pink when removed into the air. In all cases, whether the hands be blue, pink, red, or mottled, pressure produces a whiteness which does not quickly disappear. In some cases the experiment was made of immersing the blue hands, during an attack, in cold water. They would either become red and warm, or almost black and intensely cold.

I have alluded to the appearance of the finger nails. Setting aside the well-known appearance in typical Raynaud's disease and that produced by panaris, to which latter affection these subjects seem quite prone, I have observed many varieties that fall into two groups: a clubbed finger end, with broad and flat or Hippocratic parrot-beak nail; and secondly, a tapering finger end, with long and transversely curved nail. The nails are usually striated, sometimes thickly ridged longitudinally. They are sometimes a bluish, sometimes a purplish, sometimes a pink color. The broad, flat nails are more frequently a leaden blue; the long nails more often pink. Both the pink and the blue nails exhibit crescentic markings. In the pink nails there is usually one narrow and deep-red crescent between two wider and whitish crescents near the tip. The flat, leaden-colored nails usually show one wide, whitish crescent centrally. These markings differ from the whitish or reddish discoloration produced by varying pressure in normal persons.

To resume the development of our circle of cases, I have now to submit two instances that would be merely curious in themselves, but find place and explanation through each other, especially in relation with the cases of hæmoptysis and hæmatemesis recorded, and with the occurrence of blood spitting in Graves's disease. I have seen two cases of hæmoptysis in exophthalmic goiter, in both of which pulmonary tuberculosis finally developed.

Case X. Paroxysmal numbness of extremities; chlorosis; hemoptysis; pulmonary tuberculosis; acute hemorrhagic varices (?) of pharynx.—Miss V., of American birth and parentage, Scotch descent; fair complexion, brown-gold hair, gray-brown eyes; not hysterical; first had indications of numbness in the left hand and arm on nearing the menstrual period at the age of 14 years. Previous to this she had enjoyed good health, with the exception of an abscess on the left side of the neck, at the age of 8, and frequent paroxysms of hard, barking cough. She was subject in warm weather to an eruption on the hands, which was relieved by applications of black wash. The frequency of the attacks of numbness and their extent continued to increase until the age of 20, when the patient was treated for anæmia. She had then had no menstrual period for six months, had lost flesh, was very pale, had cough, and constant headache. At this time the patient came under my care (1883) for pulmonary hemorrhages with fever, and physical signs of tuberculous infiltration of left apex. Under treatment complete recovery ensued, the menses appeared, and the general tone of the health was restored. The numbness disappeared for about four years, when the attacks returned and still occur, with not so much frequency but more severity, and affecting likewise the tongue and throat. The face becomes very pale; the arm and hand seem perfectly lifeless, and can be placed in almost boiling water. When feeling is restored a violent headache follows and the patient is weak for two days. The attacks generally follow disorder of the stomach or mental disturbance, or occur about the menstrual period. At times, not connected with the attacks of numbness, there occur in the throat during glutition what she terms "blood blisters," which consist of little bluish elevations about the size of half a pea, and apparently of the nature of varices, that when ruptured, artificially or spontaneously, discharge black blood. Her sister is subject to similar but larger

"blood blisters," which, however, do not always discharge themselves, and it is said that it is sometimes necessary to puncture them to prevent suffocation. Her grandmother was liable to attacks of numbness from about the age of 30 until the age of 80.

This patient exhibits dermographism, factitious urticaria, and the eye sign. Her nails are curved, pink, marked with crescents. She has hyperopic astigmatism (Dr. Turnbull). The thyroid gland is not enlarged; there is no heart lesion.

Case XI. Blue œdema of pharynx and uvula, with urticaria of fundament; angio-neurotic œdema of trunk and face; paroxysmal tachycardia.—Mrs. B., aged 60 years, on June 26, 1892, complained of sudden dyspnœa of a few hours' duration, and soreness of the throat. For a day the patient has had urticaria of the fundament. She is subject to this form of urticaria at irregular intervals. The uvula is swollen, more upon the left, and the mucous membrane is of a grayish-blue color; the left posterior palatine fold is similarly discolored and œdematous. The swellings pit upon pressure. Scarification gives exit to less than a drachm of black blood. Two or three days ago the patient had, without known exciting cause, an attack of sudden violent beating, of the heart. She became quite faint, and lay down, and in the course of about half an hour the heart became quiet. An attack less violent and of shorter duration occurred later in the day. The attacks were accompanied with flushing and heat of the entire body. The patient has not menstruated for some years. She has had similar attacks previously. The first followed a mental shock twenty years ago. The attacks usually last twenty-four hours. Different portions of the body are swollen. Once the œdema occupied half the face; at another time half the abdomen. On three occasions it has begun in half the lip, afterwards extending to the whole structure. The tongue has been swollen.

Her urine, examined on the day following the attack reported, was amber in color, turbid, acid reaction, 1019 specific gravity, containing no albumin, no sugar; leucocytes and red cells were present.

The patient exhibits dermographism and factitious urticaria. She is not specially susceptible to cold. Her family, while long-lived, is gouty and neurotic. One of her daughters has aggravated hysteria. One sister has diabetes mellitus. This sister likewise exhibits dermographism and factitious urticaria, and as a child and young woman was subject to paroxysmal flushing of one cheek.

The following case will serve as a transition to a comparatively large group, in which digestive disorders are prominent:

Case XII. Hysteria; burning and coldness of extremities; herpetic (?) eruption; hungry dyspepsia; exophthalmos.—July 11, 1892. Mrs. R. O'D., a typical brunette, of American birth, French parentage, aged 25 years; complains of subjective and objective coldness of the legs below the knee, for a week. There is cold perspiration of the feet. For a year the patient has been feeling worn out and languid. During this time the hands have been swollen, red, and burning when she rises in the morning. The redness passes off quickly.

Sometimes there is a similar condition for half an hour toward evening. The patient is hysterical and easily frightened—the heart palpitates violently when she is nervous or excited. For three months subjective vertigo has occurred at irregular intervals. There is no dimness of vision; she sees neither flashes of light nor dark specks. Ten years ago she had "fainting spells," in which, however, she did not lose consciousness. She became dizzy, then clenched her teeth and hands, and fell; the image of the last object seen remained impressed on the retina. The attack lasted a few minutes; there was no convulsion, no subsequent drowsiness. There have been six such attacks in one day; they have become less frequent since marriage; the last was six months ago.

About a year ago there would, from time to time, appear on the legs and disappear after about two days, a papulo-vesicular eruption associated with itching. It did not pustulate and dried without scabbing. The bowels are constipated. There is headache. Sometimes there is pain referred to the stomach and relieved by eating. There is no nausea, no vomiting, no pyrosis. Appetite is excessive. There is no polydipsia. The urine is excessive in quantity, and the patient rises at night to urinate. Menstruation is irregular. The eyes are prominent, the eyelids tremble when closed. The sclera is exposed when the eyes are opened. The reflexes are all exaggerated. The heart is irregular, not specially rapid; no murmur. The thyroid gland is not enlarged. Urine: acid, 1013, no albumin, no sugar; numerous disks that may be decolorized red cells. (Dr. Eshner.)

The phenomena of disturbed and incoordinate circulation are often even more strikingly manifested in the cases diagnosticated of recent years as "neurotic dyspepsia" and "neurasthenia." In this connection I will briefly enumerate the salient features only of two additional cases:

Case XIII. Neurasthenia; lithæmia; vertigo; membranous enteritis.—Mr. J., aged 30

years; attorney; American. Hyperopic astigmatism; nausea; no vomiting; paroxysms of vertigo, with pallor, chilliness, and sweating; aggravated neurotic dyspepsia; lavage proves absence of morbid secretion; emaciation; inability to attend to business; morbid attention to symptoms; no heart or lung lesion; throbbing and murmur in abdominal aorta; exaggerated reflexes; mottled hands; pink, crescent-marked nails; dermographism, factitious urticaria; eye-sign; paroxysms of polyuria. Urine contains no albumin, no sugar; at times leucocytes, red cells, uric acid, calcium, oxalate, phosphates. Patient has membranous enteritis. Has had attacks of urticaria; is extremely susceptible to both heat and cold; hands and feet frequently become cold without apparent cause. His child has a curious mottling of the skin of the trunk and limbs that resembles measles. At times it is a vivid red, at others it fades to a delicate pink or faint brown.

Case XIV. Hysteria in a male, with neurotic dyspepsia, hæmatemesis, paroxysmal flushing, and sexual crises.—The principal points in this case, of which space forbids a full report at present, are as follows: The patient, a merchant, aged 45 years, and happily married, is highly emotional and of an hysterical family. He is stout, heavily built, with red cheeks, and dusky pink hands. His nails are of the leaden-blue variety. Dermographism, the eye-sign, and the costal fringe are present. Factitious urticaria can readily be produced, and the patient has had hives repeatedly. He is quite susceptible to moderate heat, flushing and perspiring when others feel comfortable. He has a habit of working feverishly, and is an interminable talker. After a period of overwork his digestion fails. He has burning pain in the stomach, with excessive thirst, and inability to retain anything except iced liquids. There are crises of gastric and abdominal cramp with vomiting—at times vomiting of blood—with serous diarrhea, and at times passage of membrane. He does not use alcohol or tobacco, and always has been chaste. At times when suffering with indigestion he will have sudden sensations of heat in the head and coldness below the knees, or general heat followed by chilliness, which, as he lives in a malarious region, has been called malaria. A peculiarly distressing form of the paroxysm is a feeling of heat beginning at the navel and spreading over the body, with pain in the testicles and unnatural sexual imaginings provoked by the sight of a strange man or woman "perhaps ugly as Satan;" his face becomes dusky red and his whole body trembles. This is followed by insomnia, anorexia nervosa, and finally for two or three nights by excessive nocturnal micturition, the urine being colorless as water. Such urine has a specific gravity of about 1002, and contains nothing abnormal. His ordinary urine contains neither albumin nor sugar. On two occasions colorless blood cells were found in large quantities. His blood is apparently normal, and when examined in Philadelphia during a paroxysm of subjective heat, without elevation of general temperature, malarial organisms could not be found. Lavage proved entire absence of gastric catarrh, and examination of stomach contents after test breakfast showed absence of free acid with diminished total acidity. The eyes are normal. The knee jerks are sluggish. The heart is slow (60) and feeble; dilatation not demonstrable. There are attacks of palpitation with dyspnœa. The abdomen is not sensitive to pressure. Hepatic dullness is normal. The splenic dullness is not enlarged.

In some cases of vasomotor ataxia there is a pronounced idiosyncrasy toward drugs, the most remarkable instance I have seen being the following:

Case XV. Paroxysmal headache and vertigo; circumscript œdema caused by strychnine and by picrotoxin.—Mrs. E. S., aged 47 years; of American nativity and parentage; dark hair and eyes; full habit, flushed face; was seen in April, 1890. She complained of paroxysmal headache, subjective vertigo, and flushes of heat, the symptoms being of several years' duration. There is no visual disturbance. Headache and vertigo occur together or independently. The headache is not localized, but sometimes there is a feeling as of whirling inside the skull, in the vertical region. At times there is a sensation as of cold water being poured down the back. There is no rheumatic or other personal or family morbid history. The patient is regular in menstruation. There is no indigestion, but the bowels are inclined to be constipated. The thyroid gland is not enlarged; there is no thrill or bruit. There has been no urticaria, nor can factitious urticaria be produced. Dermographism is marked. The nails are pink and purple; they are striated and exhibit pink and white crescents. The hands are always warm, frequently sweating. The feet are cold even in warm weather; at times there are paroxysms of icy coldness, without loss of sensation or change of color. The urine is scanty, less than a quart in twenty-four hours; it contains nothing abnormal. The pupils are much dilated. Dr. Hansell examined the eyes, and reports "presbyopia, no lesion of fundus, veins overfilled." The heart is slow and steady (rate 60), the pulse is full but not strong; superficial veins are not prominent. Strychnine ($\frac{1}{60}$ grain t. d.) administered medicinally caused marked œdema of the face. The patient recalled a previous experience of the same kind. Nux vomica and picrotoxin caused similar effects. Hyos-

cyamine relieved the headache; alkaline diuretics increased the urine. The patient improved, but passed out of observation. August 31, 1893, she reported at request. She is going through the menopause. The flushes of heat are more frequent. The head, neck, chest, and arms to the finger tips become red. The redness passes off in a few minutes. Sometimes it is accompanied by a numbness of the left hand and arm, and tingling with coldness in the last two phalanges of all the fingers. Sometimes the numbness will last for two hours after the redness has disappeared. A second flushing may occur before the numbness ceases. There is no periodicity in these occurrences. Perhaps they are worse when constipation exists. The hands are usually warm and moist, the feet cold. Immersing one hand in ice water it becomes quite red and slightly swollen. The wrist and forearm become blue in patches, with marked distention of venules. The hand is objectively cold, subjectively warm. The other hand is not changed in color, but quite cold. On removing the reddened hand from the cold water the finger tips first become white and numb, but after a few minutes redness returns, with a sensation of pins and needles, and both subjective and objective warmth.

Not now to detail additional instances, it may be stated that among other morbid associations found in cases of the same general character as those reported have been ecchymoses, petechiæ, hæmaturia, retinal hemorrhage, organic heart lesion, organic kidney lesion, arterio-capillary fibrosis, chorea, rheumatism, hay fever, paroxysmal engorgement of turbinate bodies, angina pectoris, and pseudo angina and glycosuria. In one case hæmoptysis occurred only during epileptic paroxysms; in another case of epilepsy, tachycardia and flushed face accompanied the convulsions. In both these cases there was a soft enlargement of the thyroid gland.

The obscurity in which the pathology of diseases of the sympathetic, or, to use Gaskell's term, the visceral nervous system, is still involved, cautions against premature assertion of other than clinical facts.

I believe that the phenomena herewith submitted for the consideration of the section are of considerable clinical significance.

Leaving out of consideration for the present the diseases other than exophthalmic goitre (akromegalia, myxœdema) known to be associated with abnormality of the thyroid gland, there are four affections of great moment in which functional or structural alteration of some portion of the visceral nervous system is an important element, if not the essential feature. These are Graves's disease, Raynaud's disease, Addison's disease, and certain forms of diabetes mellitus.

The cases here reported show the existence of lesser degrees of disturbance of that system; and indicate that in some instances, at least, there is a congenital tendency of such disturbance. They suggest, moreover, that this congenital want of balance in the circulatory apparatus may be the germ from which, under the fructifying influence of various exciting causes, the more serious disorders develop. Thus mental or even physical shock in a subject of congenital vasomotor ataxia might cause the sudden development of exophthalmic goiter; and an exposure to cold, from which a normal individual would quickly react, causes, in the subjects of this condition, local asphyxia, chilblains, frost-bite, or even extensive gangrene. So, too, slight indigestion, itself the result of influences that would be ineffectual in a normal individual, may, in the subjects of vasomotor ataxia, induce crises of vertigo, migraine, syncope, or even paroxysms of epilepsy. And similarly, other sources of peripheral irritation—eye-strain, nasal abnormity, exposure to pollen, and the like, result in the production of an exaggerated reaction. The relationship of hay fever with the group of cases under consideration, may be best exhibited by comparing two of the descriptive names it has received: "Idiosyncratic coryza" (J. Solis-Cohen) and "Periodic vasomotor rhinitis" (J. N. Mackenzie); in which connection I would cite the case of one of my patients with blue hands, who was compelled to give up his position in a drug house because of his excessive susceptibity to ipecacuanha.

The occurrence of diabetes mellitus in members of the families of patients exhibiting the phenomena of vasomotor ataxia; of intermittent glycosuria in one of my cases of menstrual migraine with urticaria and almost constant flushing of the face; and of intermittent polyuria in many of my cases, are circumstances worthy of note—

especially in relation with the well-known occurrence of glycosuria in some cases of Graves' disease, and with the investigations of Thiroloix upon pancreatic diabetes.

The tendency to hemorrhage must not be overlooked, especially in connection with the diagnosis of pulmonary tuberculosis, of gastric ulcer, and of hypertrophy of the heart. Cases such as those I have reported may develop tuberculosis or cardiac hypertrophy, but these conditions need not necessarily be present at the time of hemorrhage, or later. I would call especial attention to the extraordinary frequency with which, in cases of vasomotor ataxia, red blood cells are found in urine not discolored; a fact rendered significant to my mind by personal observation of hæmaturia in a case of undeveloped Graves' disease that later exhibited the full complexus of symptoms, and by the records of hæmaturia and hæmoglobinuria in Raynaud's disease. Unfortunately, the single case of paroxysmal hæmoglobinuria from cold that has come under my observation was not studied from the standpoint of the present paper, and is not available for comparison. In this connection, too, an interesting relation with hæmophilia, and with the purpuric group of affections is suggested; but it would not be advisable at present to more than indicate this subject.

The frequent association of refractive errors, and especially of hyperopic astigmatism, with instability of the circulatory equilibrium, raises the question whether the ocular defects are to be classed in the category of exciting causes acting by reflected irritation, or whether there is a more fundamental relation. I am inclined to the opinion that abnormity of circulation and nutrition bears a causative relation to the ametropia. The eye-strain may then react additionally upon the centers, increasing their irritability.

Finally, as exemplified by the case which first drew my attention to the subject (Case III), and by the case last reported (Case XV), we must recognize a class of cases to which, as yet, no definite nosological place has been given, and in which a varied symptomatology of circulatory disorder can not be referred to disease of any organ; though lesion of the digestive tract, of the kidney, of the heart, or even cerebral or spinal lesion may be suggested. For these cases, depending as they must, upon a want of control in the nervous system governing the caliber and tension of the vessels, a defect clearly of inhibition, and by the radius of its effects evidently central in location, it seems to me that the most appropriate name is *vasomotor ataxia.*

SUMMARY.

(1) By the term *vasomotor ataxia* it is proposed to designate the condition of instability of the mechanism of circulation present in certain persons and characterized by abnormal readiness of disturbance with tardiness of restoration, of the equilibrium of the cardio-vascular apparatus. The manifestations are most strikingly displayed by the heart and by the peripheral vessels of the extremities, but analogy indicates the occurrence of similar phenomena in the vessels of the glands and of the viscera, more especially in those of the kidney, of the gastro-intestinal tract, and of the brain. They may occur apparently spontaneously, but often there is a recognizable exciting cause. Among the influences acting as excitants, are temperature, especially cold; toxic agents formed in the body, or introduced from without; visceral or internal reflex excitation; and emotion. The stimulus may be applied centrally or peripherally, but in either case the resulting phenomena indicate a defect of central inhibition; the expression, probably, of functional or nutritional aberration in the great ganglia of the visceral nervous system, in the medullary centers, or in both. The morbid anatomy is uncertain, and the results of necropsies necessarily inconclusive.

(2) Vasomotor ataxia may be acquired as a sequela of disease; in many cases it is congenital; in some cases inherited; the condition is not rarely present in several members of a family.

(3) In some cases the phenomena are of paretic, in others of spasmodic charac-

ter. Usually the two kinds of phenomena are displayed in varying degree in the same patient. Whether spasmodic or paretic the symptoms are suggestive of incoordination. They are always in some degree paroxysmal.

(4) In exophthalmic goiter, especially such cases as are produced by emotion or are markedly intermittent, is found the extreme type of the "relaxing" variety of vasomotor ataxia.

(5) The form of Raynaud's disease, known as "local syncope" furnishes an extreme type of the "constrictive" variety; while "local asphyxia" exhibits phenomena of both abnormal relaxation and abnormal constriction of the vessels.

(6) Between these extremes are numberless gradations down to the slightest departure from normality; while even the extreme symptom groups represent merely exaggerations of phenomena that under certain conditions occur in normal individuals.

(7) Dermographism is an essential feature of vasomotor ataxia, and in most cases factitious urticaria can be readily produced by cold or by pressure or by both; mottlings of the skin, certain peculiar markings of the nails, telangiectases, and stigmata are common.

(8) There is usually a hemorrhagic tendency, as shown by ecchymoses, petechiæ, epistaxis, hæmoptysis, hæmatemesis, hæmaturia, and retinal hemorrhage.

(9) Even in the absence of hæmaturia, red blood-cells are often found in the urine; uric acid, urates, and oxalates are likewise common; the presence of albumin, tube casts, and cylindroids is less common, and is usually intermittent. Glycosuria has been observed.

(10) In many striking cases there has appeared to be morbid alteration of the thyroid gland.

(11) The action of the heart is usually rapid, irregular, and easily disturbed; palpitation is common, and in some cases intermittent tachycardia had been noticed. Hæmic and functional murmurs are not uncommon.

(12) Among other symptoms and morbid associations observed are anæmia, hysteria, drug idiosyncrasies, urticaria, local œdema, hyperidrosis, angina pectoris and pseudo-angina, organic heart disease, pulmonary tuberculosis, asthma, hay fever, vertigo, migraine, and other forms of headache, transient hemiopia and other visual disturbance, persistent mydriasis, astigmatism, myopia, hyperopia, menstrual irregularities, intermittent polyuria, rheumatism, rheumatoid arthritis, contractures of digits, chorea, epilepsy, neurasthenia, neurotic dyspepsia, gastralgia, enteralgia and membranous enteritis—most of which are doubtless fundamentally related, as effects of a common cause, or as secondary results.

(13) In making the diagnosis of simple vasomotor ataxia it is necessary to exclude primary organic disease. The occurrence of such disease later does not invalidate the original diagnosis. The development of pulmonary tuberculosis in some cases is probably a sequence of vascular and trophic disturbance in the lung. Cardiac hypertrophy and renal lesion may likewise be among the results of disordered circulation.

THE IMPORTANCE OF ELIMINATING PELVIC DISEASE IN GENERAL DIAGNOSIS.

By MARY H. McLEAN, St. Louis, Mo.

In this age of refined specialties many hoarse notes of warning are heard from the general practitioners about allowing one's special department to become a beam in one's own eye, shutting from view all other diseases and conditions.

Very especially, gynecologists have been arraigned again and again for their single eyes and shortsightedness, and for their great ingenuity in tracing all the ills of

woman to some lesion in the pelvis. Not only so, but "hands off" has been the cry to the gynecologist; and some neurologists have traced long series of severe and complicated nervous symptoms to a pelvic examination and gynecological treatment.

No doubt all of this brotherly counsel has been needed and has answered a good purpose. But sometimes an unusual series of cases or an occasional review of one's case book will lead the gynecologist to feel that, in justice to his fellows, the neurologist and general practitioner, he too must utter a note of warning, and must point out another danger quite on the other side of the stream.

Valuable time is often lost and a woman's strength wasted through useless efforts to overcome a distressing disorder, or through the general treatment of a protracted fever, in either of which the casual relation of a deep-seated pelvic trouble has been overlooked.

In the days when uterine displacements were the cause and substance of nearly all pelvic disease, and when the sympathetic nervous system was an unknown quantity, it is not strange that the general profession should have been skeptical as to the role played by pelvic disease, and should have persisted in general therapeutics in the tedious chronic disorders of women.

But since the endometrium with its extension into the Fallopian tubes has assumed so important a role in pathology, and since we have begun to learn something of its intimate connection with the brain, heart, lungs, stomach, and entire alimentary canal, and of its subtle influence on the vaso motor and trophic nerve centers, it ill becomes the phycician to ignore the possibility of a pelvic lesion in any disease which does not quickly respond to a careful general therapeusis.

Within a few years Dr. Formad, of Philadelphia, has astonished the world by publishing the real pathological findings in cases whose deaths were attributed to "heart failure." In thirty-five cases of sudden death occurring in one city in one year, a ruptured extra-uterine pregnancy was found, a condition which is now thought to be due to a preexisting disease of the endometrium and Fallopian tubes. If statistics could be gathered, we would probably find an equally startling number of sudden deaths over the country from ruptured ovarian and tubal abscesses, and from perforative appendicitis.

But the sadness of such a list of deaths does not at all compare with the sadness of years of invalidism treated on general principles, which might have been relieved through the recognition of a causative pelvic pathology.

Gynecologists have been arraigned for subjecting young girls to unnecessary pelvic investigations, and the advice is still frequently given to treat the general condition, to surround the girl with all the hygienic advantages, and to let nature work the cure. To my mind the injury inflicted upon a girl by allowing a possibly incipient pelvic disease to develop, to gain control of the sympathetic nervous system, to weaken the digestive and muscular systems, and to limit the growth of the intellect, is far more serious and irreparable than any possible injury which could result from a properly conducted pelvic examination.

A young woman, aged 19, was sent to me from southern Kansas. She had been a great nervous sufferer for almost three years. The origin of the trouble seemed to have been a jump from a barn 20 feet high to the ground. She was supposed to be suffering from some obscure injury to the spinal cord. She had constant headache and backache increasing in severity, great mental apathy, insomnia, and frequent hysterical convulsions. She had been treated during all the time by general practitioners with little or no improvement. She was considered too young for a pelvic exploration.

I found on examination a severe endometritis with a left salpingitis, and some thickening and contraction of the left broad ligament drawing the uterus back and to the left. Under gynecological treatment the patient steadily improved and entirely recovered her health within a few months; but she greatly regrets the loss of those valuable years of her life.

Another young lady of 19 years was sent to me by a general practitioner after she had been under various other physicians for about three years. She had a most obstinate gastric irritability. For three or four weeks at a time she vomited literally all of the food she took. At all times even the most carefully selected foods were digested with great discomfort. A great variety of treatment, several climatic changes, and faithful use of the stomach pump failed to check progressive emaciation and debility.

A pelvic examination revealed an endometritis, which was treated by aseptic curettement and relieved. Afterwards the stomach responded to treatment formerly used in vain, and the patient gained flesh and strength.

A married woman of 40 years of age, the mother of four children, had spent eight years of invalidism under the care of a well-educated physician and surgeon. She was a neurasthenic, put to bed for several days by any little domestic excitement, suffering several times a month with violent headache and nausea, lasting from forty to seventy hours, quite unable to endure the noise of her nursery, and haunted with a constant dread of insanity. She was treated with tonics, sedatives, and stimulants, including bromides, phenacetine, antipyrine, brandy, and finally with increasing doses of morphine.

An examination of the pelvis revealed a subinvoluted uterus with granular endometritis, and old lacerations of both cervix and perineum.

Preparatory gynecological treatment and subsequent operative measures quite entirely relieved her, so that she had absolutely no headache, no gastric trouble, no nervous irritability, and no mental anxiety afterward. Rest and good food completed a brilliant cure, which might have been attained years before, had not the pelvic disease been overlooked.

My friend, Dr. Bertha Van Hoosen, of Chicago, has given me the history of the following case which well illustrates the principle we wish to establish:

Mrs. L., aged 35, married fifteen years; at 15 years of age had what the doctor called an abscess of the ovary, although he made no examination. She made a poor recovery from the attack and had other attacks similar to this before marriage. At 20 she was married in her bed, being too sick to stand during the ceremony. She has been an invalid ever since, unable to do her housework or to enjoy social life. Last January (1893) she had an attack of peritonitis, ending in a rectal fistula that has been discharging large quantities of pus ever since. She has been treated for years for gastralgia and nervous prostration without benefit. No local examination was made until July, 1893, when I found a large exudate filling up the cul de sacs and embedding in it the uterus and appendages, with a fistulous opening high in the rectum discharging daily two ounces of offensive pus.

No one can doubt for a moment that such pathological findings easily account for the years of suffering spent under the constant care of a general practitioner.

A number of cases have been published during the past few years, in which appendicitis was found and relieved by surgical measures after several weeks of fever diagnosticated as typhoid or typho-malarial fever. Such a case of recent date which failed to receive surgical relief has come to my knowledge.

A brilliant young woman from Michigan was taken sick with a fever, pain in the right iliac region, abdominal distension, etc., and was treated through many weary weeks for typhoid fever. During what was supposed to be a slow convalescence she was taken to her Michigan home, where, after a sudden furious peritonitis, she died.

The autopsy revealed a general purulent peritonitis, resulting from a secondary rupture of a perforative appendicitis.

Dr. H. T. Byford, of Chicago, in a recent lecture on tubercular diseases of the Fallopian tubes and peritoneum before the Chicago Post-Graduate School of Medicine, stated that in two cases of supposed typhoid fever of over two months' duration, to which he had been called in consultation, he had found tubercular disease of the tubes to be the cause of the typhoid symptoms.

The cases cited are sufficiently convincing to warrant us in drawing a few prac-

tical conclusions: First, pelvic diseases have a wide and varied symptomatology, by reason of which they may simulate various general and nervous disorders; second, grave errors in diagnosis have been made through neglect of a thorough examination of the case, especially of the pelvis, thereby entailing upon the patient prolonged suffering and even death; third, in the diagnosis of any disease which might be complicated or induced by disease in the pelvis it is far better to make an unnecessary gynecological examination than to incur the risks of a mistaken diagnosis.

TRATAMIENTO QUIRÚRGICO DE LA FIEBRE AMARILLA.

Por SEGUNDO BELLVER MATEO,
Médico Mayor Principal Primero del Cuerpo de Sanidad Militar Español, Isla de Cuba.

En otra nota* he consignado sintéticamente mi opinión sobre la naturaleza toxi-infecciosa del cólera americano y su localización gastro-intestinal: allí expongo el tratamiento que sigo y los resultados verdaderamente concluyentes que se obtienen cuando es empleado desde las primeras horas de la invasión y que cuando el caso es descuidado y se acentua la oliguria, la terapéutica ordinaria mejor dirigida resulta impotente para vencer la auto-intoxicación urémica.

Una serie de trastornos, facilmente concebibles, explican satisfactoriamente este complexus sintomático que cierra con broche negro el cuadro al parecer halagüeño del período de remisión. La disminución creciente de oxihemoglobina dificulta el desdoblamiento de los cuerpos azoados en la glándula hepática, y por retención de uno de sus productos se provoca la infiltración grasosa imposibilitando las oxidaciones regresivas. Sin sufrir las sustancias coloides la transformación cristaloide no pueden ser dialisadas por los filtros renales y por lo tanto la colemia, la acolia y finalmente la uremia son las fases sucesivas de la auto-intoxicación amarilla.

Dos formas suele presentar la uremia: la adinámica y la ataxo-adinámica. En la primera algunos casos raros conservan la inteligencia; la segunda es la más comun en la Isla de Cuba; no puede quedar en firme la opinión de M. Havelburg de Rio de Janeiro, que asegura, que en los enfermos de fiebre amarilla† "la inteligencia permanece normal hasta la muerte;" en la Habana el $\frac{98}{100}$ mueren inconscientes presentándose la perturbación intelectual veinte y treinta horas antes de la muerte.

La terapéutica seguida en esta fase de la enfermedad es en general lo más pueril que puede darse; todos casi sin escepción mueren solicitamente atendidos por los clínicos sin intentar algo que salga del patron cortado que, á semejanza de los uniformes contratados para el ejército, á ninguno viene bién; es preciso tomar las dimensiones y "poner el remedio á la altura del mal."

Creo firmemente que hay algo más que hacer y que la oxigenación rectal, pulmonar ó intersticial tienen una neta indicación; la hipodermo-clisis y especialmente la inyección intravenosa de suero artificial esterilizado practicadas con oportunidad, ántes que la uremia se acentue, evitarán la graduación del envenenamiento y salvarán muchos, sentenciados á muerte por la timorata terapéutica.

Si la uremia es muy intensa, aun cuando se recurra á estos medios, suele acontecer que el enfermo sigue comatoso, á pesar de haber eliminado grandes cantidades de orina, pasadas seis ú ocho horas de la inyección intravenosa de dos á tres litros de suero artificial esterilizado á 34°, morirá el enfermo irremisiblemente. Deberá sin pérdida de tiempo procederse á practicar nuevamente otra inyección intravenosa de suero, al par que se dá salida por una vena de otra estremidad, á igual cantidad de sangre ampliada, pudiendo ambas calcularse en tres litros, y terminando por la transfusión de un litro de sangre humana ó en su defecto de siete á ocho cientos centímetros cúbicos de sangre animal. Á la combinación de la inyección de suero con simultanea

* Tratamiento médico del vómito negro.
† Semana Médica, 2 marzo 1892.

depleción de sangre seguida de transfusión sanguinea la donomino difusión de los venenos ó *toxidifusión*.*

Un frasco de baca inferior sirve bién para la transfusión serosa: para la *toxidifusión* los transfusores Colin, Mathin, etc., pudiendo remplazarlos por un embudo de cristal grande ó en último caso de hoja de lata que en cualquier parte se puede encontrar, una lanceta, un trocar-aguja y tubos de goma: escusado es recomendar la más rigorosa técnica aséptica.

Once casos, anúricos de veinte á treinta horas, urémicos acentuados y la mayoría agónicos he tenido ocasión de tratar por la transfusión serosa y de ellos tres se han salvado; los restantes he pronosticado su muerte sinó se recurria urgentemente á la toxidifusión. Circunstancias que no es pertinente exponer,† hicieron imposible su práctica.

TRATAMIENTO MÉDICO DEL VÓMITO NEGRO.

Por SEGUNDO BELLVER MATEO,
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La bacteriología hasta el presente demuestra que la fiebre amarilla no es infección general y que al localizarla únicamente el tubo digestivo es el órgano indicado.

En espera de la demostración esperimental cree el autor fundado en la observación clínica y necrópsica que es una infección gastro-intestinal con toxemia microbiana concomitante y auto-intoxicación urémica consecutiva por la acción que las diastasas ejercen sobre la sangre, rebajando su función respiratoria, dificultando la oxidación de la hemoglobina y disminuyendo considerablemente por lo tanto la cantidad de oxigeno circulante, resultado final que dá cumplida explicación de la uremia por retardo ó suspensión del proceso de oxidación regresiva.

Desde el año 1878 en que en estas ideas se afirmó, con ellas consecuente, el autor ha tratado los enfermos por los purgantes, los antisépticos y los hiperoxidantes, cambiando frecuentemente los segundos á medida que la química y la clínica, nos los daban á conocer: desde 1888, en que á la naftalina relevó el naftol A, antiséptico ideal del tubo digestivo, no ha inducido cambios en el tratamiento, á escepción de dar la preferencia al benzoato de sosa sobre el salicilato.

He aquí como procede: Administra por primera intención de 60 á 100 gramos de sulfato de sosa, en 300 de agua, repitiéndole si es devuelto por vómito: á las dos horas, sin esperar el efecto purgante, una cápsula con medio gramo *a* naftol, que se repite cada hora ó cada dos, segun la intensidad del caso: diez gramos de benzoato de sosa por litro de agua azucarada para tomar cien, tras cada capsula, mezclada con igual cantidad de agua de Selz, permitiéndole ademas la beba *ad libitum*, natural ó fria.

La más rigorosa dieta absoluta durante los cinco primeros dias por lo menos: al colera americano, como al asiático hay qui matarlos de hambre y en agua ahogarlos. La medicación sintomática en el primer período, no debe distraer la atención de los asistentes, mas que en el caso que los trastornos que la exijan sean de tal naturaleza que dificulten el tratamiento, intolerancia gástrica, ó pongan en peligro el funcionalismo orgánico, hiperpirexia.

Para lo primero hielo interiormente é inyección atropomórfica. Para lo segundo baños prolongados á la temperatura ambiente 25 á 30 centígrados y huir de los antitérmicos farmacológicos, que por acción retardadora de las oxidaciones deben ser proscritos en absoluto. Los vinos generosos y las pociones tónicas alcoholizadas, la estricnina, la cafeina, la entero-clisis de suero artificial frio ó caliente alternativa-

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* Revista de Ciencias Médicas, agosto 1891, Habana.

† Resistencias oficiales, temores de los encargados de su asistencia; falta de sangre.

mente, para levantar las energias y aumentar la tensión arterial, generalmente tan deprimidas, son medios que deben ser usados, si bién con muy pocas esperanzas de éxito, cuando el caso es grave y la oliguria se acentua.

Las hemorragias no son detenidas ni con el percloruro de hierro por el estomago ni con la ergotina en inyección hipodérmica.

Contra la anuria y la uremia se han agotado todas las medicaciones y demostraria no haber visto enfermos, quien en medicación alguna confie; todo resulta desesperantemente inútil.

Los enfermos tratados como queda dicho, en las doce primeras horas de la invasión dan una mortalidad tan pequeña que apenas se llega al 1.50 por ciento: el grupo de los que recibieron el tratamiento desde las doce segundas horas del primer dia clínico da un promedio de 3 por ciento, los del segundo dia 13 por ciento, los del tercer dia 30, los del cuarto y quinto 70 por ciento, cifras aproximadas.

Las estadísticas de otras medicaciones seguidas tambien en el Hospital Militar de la Habana, dan cifras elocuentísimas, en los dos primeros grupos, ó sea en los que el tratamiento comienza en el primer dia, pues resultan decuplicadas, en los de segundo dia triplicadas, siendo escasa la diferiencia en los demas. Cuatro años y más de dos mil casos dán valor á estos datos comparativos.

THE COMPLICATING CONDITIONS, ASSOCIATED DISEASES, AND MORTALITY RATE IN ERYSIPELAS.

By JAMES M. ANDERS, M. D., Ph. D.,

Professor of medicine and clinical medicine at the Medico-Chirurgical College; physician to the Philadelphia Hospital, etc.

During the year just past I have been engaged in conducting an investigation into the disease erysipelas. A portion of the results obtained from these researches were given in a recent paper on "The seasonal influences in erysipelas, with statistics."* More recently I read an article on "Some points in the etiology and clinical history of erysipelas, with statistics," before the section on the practice of medicine of the American Medical Association at its last meeting, in which article additional results were reported. To some of the conclusions reached in the latter paper I desire to make brief reference presently. While collecting data, with a view to determining the duration of erysipelas, I had occasion to inquire into the effect of complications on the general course of the disease. Upon this point the following inferences may be found in my last paper:

> The average duration of the affection was computed in 1,880 cases and found to be (including relapses) 25·13 days. At any period of life, according to these observations, the stay in a hospital or the duration of a case in private practice was lengthened almost indefinitely when the patient had been previously in an enfeebled condition on account of chronic disease and when complications existed. The average course was found to be much less in uncomplicated cases occurring in persons under 40 years, which is the time of life corresponding with a preponderating proportion of cases, viz, about fourteen days.

These results also point strongly to the important practical fact that "erysipelas in a typical form is a self-limited disease; that the length of the attack is greatly influenced by the age of the patient *per se*, its average duration in persons over 50 years being considerably longer than in younger subjects. Sex has no influence in this direction."

I have directed attention to the influence of age upon the course of the disease—a factor that is especially operative at a period of life when cases are relatively infrequent—for two reasons: First, because it is an interesting and novel fact; and,

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*Read at the meeting of the American Climatological Association, 1893.

secondly, that the other and more notable factors, as complications, etc., shall not be overrated.

Respecting those associated diseases that are not to be classed as true complications additional data will in this connection be adduced. In my published article, before alluded to, may be found an analysis of 1,665 cases, and the data show which affections predispose most potently to erysipelas, as well as the comparative frequency of their occurrence, as follows: In the course of chronic leg ulcers 67 occurred; in chronic pulmonary tuberculosis and chronic nephritis, 15 each; in chronic rheumatism, 14; in organic heart disease, 10; in urethral stricture, 6; in syphilis and synovitis, 5 each; in asthma, chronic pleurisy, and chronic alcoholism, 4 each; in bone necrosis, malaria, locomotor ataxia, senile debility, and puerperal state, 3 each; in typhoid fever and sciatica, 2 each, these being 7·8 per cent of the total number of instances.

The result just narrated fitly corroborated the broad fact—one long since appreciated by the profession—that certain conditions and diseases increase the liability to the complaint.

I purpose to present, in the next place, the results obtained from a study of a series of 1,674 cases which were analyzed with particular reference to complications. Of the latter there were: abscesses, 105 (of which the following only were classified: Of eyelids, 5; abscesses with ulcers, 2; of leg, 3; of foot, 3; of finger, scalp, elbow, glands at angle of jaw, 1 each); rheumatism, 20; pneumonia, 7; catarrhal pneumonia, 2; pleuritis, 7; delirium tremens, 10; delirium, 7; albuminuria, 8; acute nephritis, 6; synovitis, 5; phlebitis, 7; diarrhea, 5; tonsilitis, 3; otitis media, pharyngitis, acute bronchitis, œdema of larynx, 2 each; angina pectoris, iritis, epistaxis, scurvy, hemiglossitis, neuralgia, sciatica, mastoiditis, pyæmia, endocarditis, eczema, jaundice, paralysis, meningitis, carbuncle, hysteria, apoplexy, insanity, arthritis, diphtheria, followed by leg ulcer and repeated hemorrhages, 1 each. Not a few of the complications which are mentioned by authors of modern text-books and other recent writers as being leading ones are, according to the results of these observations, actually rare. On the other hand, certain complicating conditions not emphasized in medical literature occur relatively frequently, notably acute articular rheumatism. With reference to this latter affection it should be pointed out that the attention of the profession has not hitherto been directed to the fact that it is quite frequently associated with erysipelas. It is seen that, according to the above table, it ranks next to abscesses in point of frequency, and that it is present twice as often as delirium tremens, which stands third as to frequency of occurrence. In only 3 instances did the rheumatic attack precede the appearance of the erysipelas by two or three days. The symptoms of rheumatism usually came on several days after the onset of erysipelas. I will not at this time venture an opinion to explain why acute articular rheumatism should develop in the course of an existing erysipelas as often as would be indicated by these researches. So long as the specific agent on which rheumatism depends is not known, so long must we remain in ignorance of the true explanation of this combination of diseases.

It might be argued with considerable show of reason that the arthritic disturbance is purely symptomatic of a pyæmic condition, and hence nonrheumatic in nature; but this latter view can not be correct relative to at least one half-dozen instances in which a detailed description of the symptoms was given. Moreover, I have endeavored to eliminate what might be regarded as doubtful cases, classifying them as "synovitis," etc. In connection with this, the fact before stated, that in fourteen instances chronic rheumatism preceded the attack and most probably operated as a predisposing factor, should be borne in mind. From these statistics it may be seen that pneumonia and pleuritis complicate erysipelas in a small proportion—less than 1 per cent—of the cases. In some instances pneumonia appeared early, hence it was due, most probably, to a special localization of the specific streptococcus. To such the term "pneumo-erysipelas" is here applied. The cases—2 in number—in which acute nephritis developed during the first few days of the attack should be termed "nephro-erysipelas."

I do not doubt that pneumonia, both lobar and catarrhal (the latter probably always), and acute nephritis, as well as pleuritis, may also occur as secondary results. It should be pointed out that acute endocarditis was present in but a single instance, and, since this complaint is held to be a relatively common complication by most recent authors, the present results may excite considerable surprise. Meningitis, which was formerly thought to be quite frequent, but is believed to be rare by a few recent writers, was present in one instance only, thus corroborating the latter view. Active delirium in this disease points to a severe type of infection, and not, as a rule, to meningitis. Precisely what is implied by "a complicating synovitis" it would be difficult to determine, unless we believe it to be a pyæmic manifestation—a not unlikely theory, I think. Perhaps certain other conditions, supposed to be complications, are to be regarded as pyæmic indications, such as jaundice, etc. Mastoiditis, otitis, media, tonsilitis, and œdema of the glottis are to be looked upon as secondary developments.

Some interesting facts relating to the mortality rate of this disease were also brought to light by these researches. In the opinion of all authors the death rate is exceedingly variable, ranging, according to some writers, from 1 to 50 per cent. That it does exhibit great variations in this respect can not be reasonably denied, but the limits of its diversities have been by many too widely separated. The correctness of this latter assertion will be evident after a glance at the accompanying table, which gives the number of cases from the different institutions separately, in which the terminations were recorded, with the number and percentage of deaths for each hospital, as well as the same points with reference to the cases derived from private practice:

TABLE I.

Source of cases.	Number of terminations recorded.	Number of deaths.	Percentage of deaths.
Blockley Hospital	1,095	73	6·29
Pennsylvania Hospital	523	27	5·1
Episcopal Hospital	71	9	12·6
Johns Hopkins Hospital	16	3	18·75
German Hospital	9	3	33·3
Private practice	96	4	4·16
Total	1,810	119	6·57

General average mortality, 6·57.

It will be observed that the variations in the percentage of deaths are not so great in the larger individual series, which are composed of sufficient cases on which to base reliable inferences. The general average mortality rate, it is seen, is 6.59 per cent. The cases from private practice gave a lower death rate, or 4.16 per cent. In the female sex it is 1.5 per cent lower than in the male, according to these statistics. Surgical or traumatic erysipelas has a higher ratio of deaths than indicated by the general average. There were 101 cases classified as purely traumatic, and for these the percentage of deaths was 14·5.

A careful study of the cases which were preceded by chronic illness shows that they swell the general average mortality list, the increase being not less than 25 per cent. When occurring in the course of chronic Bright's disease the percentage of deaths was as high as 40, while in pulmonary tuberculosis (first and second stages) it was 30. The disease proved fatal in 2 cases that occurred during convalescence from typhoid fever.

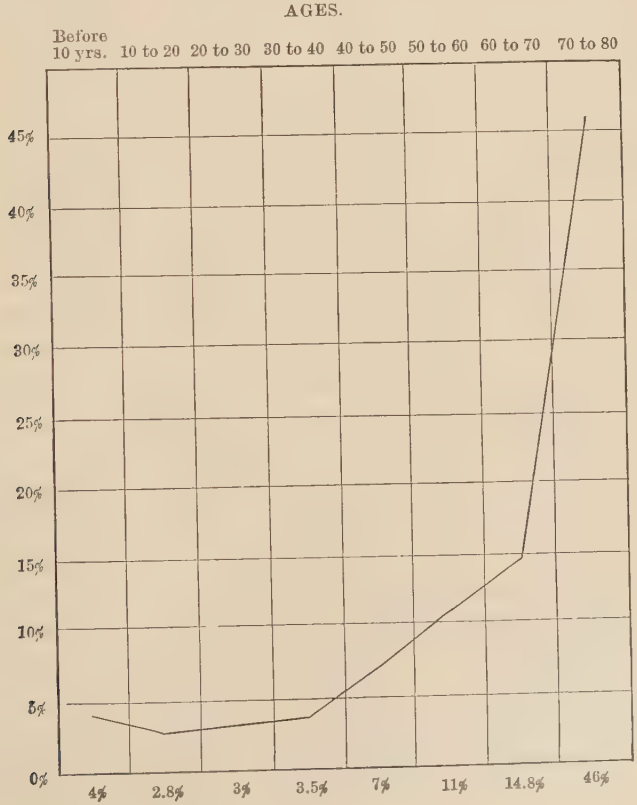
The effect of complications upon the frequency of deaths is a question of lively interest and primary importance. This point also was investigated.

The comparative gravity of the leading complicating conditions and diseases is shown by the following table:

TABLE II.

Complications.	Instances.	Deaths.	Percentage of deaths.
Abscesses	105	8	7·6
Acute rheumatism	20	2	10
Pneumonia	7	4	57·1
Pneumonia, catarrhal	2		
Delirium	7	4	57·1
Delirium tremens	10	8	80
Pleuritis	7	1	14·3
Acute nephritis	6	3	50
Phlebitis	7		
Synovitis	5		
Diarrhea	5		
Œdema of larnyx	2	2	100
Pyæmia	1	1	100

It will be seen that while abscesses are common they do not to any extent augment the mortality rate. Pneumonia, delirium, delirium tremens, and acute nephritis are among the graver complications. Acute rheumatism, on the other hand, stands second in frequency, but is comparatively harmless. To account for the increase in the percentage of fatal cases due to acute articular rheumatism we possess no positive knowledge. The opinion is, and long has been prevalent, that erysipelas benefits and even cures acute articular rheumatism and other affections, including carcinoma and sarcoma.



Age modifies the mortality. Above may be found a tracing which represents the percentage of deaths in erysipelas, for the different decades, from the time of birth to 80 years of age. The line rises in increments of five. The mortality, it will be seen, is much less than the general average—i. e., 6.57 per cent—from birth to 40 or 45 years, and then it gradually becomes greater until we reach 60 years. After 60 each year increases considerably the percentage of deaths, while after 70 the percentage rises rapidly to 46. While age, *per se*, as has been stated, influences the death rate quite materially, it does so only in persons over 45 years of age. Other factors must not be overlooked. It was among middle-aged and old persons that, comparatively speaking, most of the cases occurred in which chronic affections were associated. These latter, as previously shown, exert considerable influence upon the mortality. The various complications before mentioned did not prevail more extensively during the later than during the earlier periods of life.

In conclusion I would submit a few deductions which may serve not only to reiterate some of the leading demonstrated facts, but also to facilitate a discussion of the same:

(*a*) In typical cases erysipelas is a self-limited disease, the average duration in persons under 40 years of age being fourteen days.

(*b*) The course of the disease was greatly lengthened when complications were present or chronic affections preexisted, as well as when occurring in persons over 50 years of age.

(*c*) Certain chronic affections, notably pulmonary tuberculosis, chronic nephritis, chronic rheumatism, and organic diseases of the heart, increase the susceptibility to the complaint, having been present in 7.8 per cent of the total number of cases.

(*d*) The most common complications were abscesses and acute rheumatism; the rarest meningitis and ulcerative endocarditis, pericarditis not having furnished a single instance.

(*e*) The general average mortality was 6.57 per cent, while in the cases from private practice it was 4.16 per cent; in persons under 40 years it was only 3.5 per cent, in those over 70 years 46 per cent, and in the traumatic cases 14.5 per cent.

(*f*) The mortality list was augmented as much as 25 per cent by the presence of coexisting chronic affections.

(*g*) The numerous complications also increased the percentage of deaths, and certain of them in an especial degree, notably lobar pneumonia, acute nephritis, delirium tremens, and active delirium.

(*h*) Age has a decisive influence upon the mortality after the forty-fifth year, this effect becoming more pronounced after the sixtieth year.

ALGUMAS PESQUIZAS SOBRE O HEMATOZOARIO DE LAVERAN.

Por MONCORVO FILHO,

Chefe de clinica encarregado do serviço bacteriologico da Clinica de Pediatria da Policlinica do Rio de Janeiro, Assistente do Laboratorio de Biologia, Membro effectivo do Gremio dos Indernos dos Hospitaes, actual Bibliothecario do mesmo Gremio, Socio fundador da Sociedade Nacional de Acclimação, etc.

Encetei ha cerca de tres annos algumas investigações sobre o hematozoario do paludismo, assignalado por Laveran em 1881. Durante o anno de 1892, 21 casos serviram para o exame do sangue, alem de muitos outros observados nos annos anteriores. Usei nestas pesquizas dos processos de Laveran, Grand, Romanousky, Roux, etc. Tive ensejo de fazer, por vezes, em dias consecutivos, o exame do sangue do mesmo doente, accusando ora maior, ora menor ascenção thermica, desde a temperatura pouco acima da normal até acima de 40° e mais, ouainda no periodo de apyrexia. Todos os cuidados antisepticos presidiram os meses estudos. Escrupuloso como deve ser todo o experimentador, eu não me julgo, em vista das indicisões que paivam

ainda em meu espirito, autorisado a tirar uma conclusão definitiva sobre grande numero de casos observados no Serviço de Pediatria da Policlinica do Rio, debaixo do ponto de vista microscopico.

Direi apenas que taes observações, realizadas com muito interesse e rigor scientifico, deixaram-me ate agóra, grande duvida sobre os resultados colhidos, pelo menos no tocante a infancia, sobre a qual convergiram as minhas pequizas, incitando-me dest'arte a nellas proseguir com o maior empenho, para mais tarde pronunciar-me a respeito.

O Prof. Treille, da Algeria, cujas observações foram colhidas em fecundo campo de estudo, bem como o Prof. Guido de Baccheli, muito hesitam ainda em accitar as conclusões de Laveran. O primeiro havendo encontrado o hematozoario na urina de individuos não affectados de malaria e o segundo não o havendo encontrado no sangue de doentes de febre palustre.

Parecem-me pois dignas de nota as objeções de tão distinctos investigadores.

Não devo, a proposito, esquecer um facto curioso que verifiquei tambem no correr das observações do anno proximo passado. Alguns observadores relatam que tendo occasião de examinar ó sangue de seus doentes malaricos submettidos as azul de methyleno encontraram as hematias coloridas daquella substancia. Taí tentamen tambem por mim foi practicado em alguns doentes do Serviço de Pediatria da Policlinica, sob a acção daquelle agente therapeutico; os globulos de sangue, porem, a presentavam-se com a sua coloração normal e mesmo não pude verificar a existencia da menor particula daquella materia corante apezar de se acharem coloridas de azul, a urina e as dejecções dos referidos doentes.

ESTUDO SOBRE A IDENTIDADE DO MICROBIO DA LYMPHANGITE E DA ERYSIPELA.

Por MONCORVO FILHO,

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Como tivesse ensejo de examinar diversos casos de lymphangite aguda debaixo do ponto de vista microscopico, e conseguisse um resultado bastante satisfactorio, entendi dever publicar as minhas pesquizas a respeito.

Eis porque apresso-me em fazer esta pequena nota. Encontrei logo, que me decidi a estudar tão momentosa questão, 15 casos de lymphangite aguda onde pude operar os meros estudos.

Foram Verneuil e Clado (1889) os primeiros a demonstrar a identidade da erysipela e da lymphangite aguda; depois delles Sabouraud, interno do Prof. Besnier, encontrou no serosidade e no sangue extrahidos de membros elephanciacos no periodo de crises lymphangiticas o streptococcus de Fehleisen, ó qual seria dest'arte para elle o microbio determinante das lymphangites e da elephantiasis européa.

Em 12 dos 15 casos por mim examinados, encontrei o streptococcus de Fehleisen quasi sempre em estado de pureza. Foram practicadas culturas, ora em caldos liquidos, ora em caldos solidos de gelose ou gelatina.

A technica usada para a extracção da serosidade era a seguinte: Depois de bem lavada a região doente com uma forte solução antiseptica e em seguida com agua distillada, com o auxilio de uma lanceta esterilisada, fazia-se uma picada, a segunda gotta de sangue ou de lympha que apparecia era recebida em balõezinhos esterilisados e soldados a lampada. Ao cabo de dezoito ou vinte e quatro horas, delles me servia para semeações em caldos ou para preparações microscopicas.

Trez cães e trez ratos brancos serviram para a verifição experimental. Tiveram a erysipela bem caracterisada se bem que o streptococcus inoculado tivesse provindo de casos de lymphangite aguda.

Emfim para terminar, passo a inserir as conclusões do meu longo trabalha aqui resumido nesta pequena nota:

1°. Que diante das demonstrativas investigações bacteriologicas de Verneuil e Clado, de Sabouraud e das minhas proprias realizadas sobre 15 casos, a lymphangite aguda e a erysipela nada mais são do que modalidades diversas de uma mesma affecção infecto-contagiosa e bacteriana.

2°. Que o germen dellas productor é o streptococcus de Fehleisen, microorganismo hoje perfeitamente estudado e conhecido; de facil pesquiza, cultura e inoculação experimental.

3°. Que o streptococcus erysipelatus póde em certos casos coincidir com a presença de outros microbios, como sejam o streptococcus pyogenus (aliás reputado identico áquelle por H. Roger), o staphylococcus albus, ou aureus, ou citreus, etc.

4°. Que as crises lymphangiticas successivas, com curto intervallo de interrupção muito notadas em certos individuos, principalmente em nosso clima, tem perfeita explicação, pela permanencia do microbio de Fehleisen no sangue podendo ahi conservar-se sem virulencia algum tempo devido a causas diversas, e tornar a adquiril-a e ainda mais proliferar, desde que certas outras causas para isso concorram.

5°. As contraprovas positivas das pesquizas de Verneuil e Clado, parecem demonstrar definitivamente a identidade de cauza e natureza da lymphangite aguda e da erysipela, outrom reputadas entidades morbidas distinctas.

HISTOIRE DU PALUDISME ET SES COMBINAISONS AVEC LA FIÈVRE TYPHOÏDE ET LE TYPHUS DANS LA VALLÉE D'ORIZABA (MEXICO).

Rapport du Docteur GREGORIO MENDIZABAL.

Investi par le gouvernement de l'État de Véra-Cruz, un des plus importants de la République Mexicaine, de l'honneur de représenter cet État au 1er Congrès Médical Pan-Américain, je n'ai consenti à accepter cette mission difficile à remplir que pour rendre ce faible service à mon pays, et tout particulièrement à l'État où j'ai reçu le jour, et ainsi que pour satisfaire mon vif désir d'augmenter au soin de cette notable assemblée le contingent de mes connaissances médicales, tout en ayant la certitude de mon insuffisance pour occuper avantageusement un poste aussi élevé.

Pour mieux comprendre ce que je vais exposer, je commencerai par faire une description de la vallée où est assise la ville d'Orizaba, de sa situation topographique, de son altitude, de sa latitude, des traits les plus saillants des phénomènes météorologiques qui y ont été observés, de son orographie, de son hydrographie, des conditions hygiéniques de la ville, et, sans sortir des limites étroites que m'impose ce travail, de tout ce qui peut contribuer à nous rendre compte de la manière d'être du paludisme dans ces contrées, ainsi que de son influence sur les maladies qui compliquent, très spécialement, la fièvre typhoïde et le typhus.

Les plaines élevées du plateau central, formées par le développement et le partage de la Cordillière des Andes, qui, depuis les confins de la côte occidentale de l'Amérique du Sud, produisent une chaîne non interrompue avec les montagnes gigantesques que nous appelons au Mexique "La Sierra Madre," vont terminer par une descente graduelle et lente aux plages embrasées du Golfe du Mexique et à la côte du Pacifique, créant de superbes et splendides versants qui font de notre pays un des plus beaux, des plus pittoresques de la terre.

Dans un des multiples versants orientaux de cette vaste chaîne qui sépare l'État de Véra-Cruz du plateau central, ayant pour noyau au point de départ le pyramidal "Citlaltepetl" (Volcan d'Orizaba), se trouve une vallée riante et fleurie, au sol très fertile. Par ses paysages, l'une des plus belles, des plus agréables par son climat, des plus saines par sa situation topographique, un printemps éternel y règne comme dans la plupart des régions tempérées.

Le voyageur qui descend du plateau central en suivant l'audacieuse voie ferrée qui relie Mexico à Véra-Cruz commence à se rendre compte de la situation de cette vallée, en sortant tout à coup du tunnel numéro 10. Il se remet bien vite de l'effrayante impression qu'il a reçue dans la vertigineuse descente des "Cumbres de Maltrata," que le train a côtoyée en serpentant au bord du précipice; et après avoir traversé les défilés terrifiants de "La Joya" et de l'Infiernillo," il embrasse du regard, dans toute son étendue, le surprenant vallon, toujours vert, toujours gai, sillonnée de petits ruisseaux, qui conduit le passager par une pente majestueuse et lente dans la grande et charmante vallée d'Orizaba.

La ville d'Orizaba est située par 18° 50′ et 56″ de latitude N. et par 2° 7′ et 54″ de longitude E. de Mexico. Elle se trouve à 1,236 mètres au dessus du niveau de la mer, et à 104,263 mètres de la côte du golfe. L'azimut de l'aiguille magnétique est de 8° 25′ E. La ville est située dans une plaine qui part du pied du coteau du "Cerro del Borrego;" l'inclinaison de son sol est tellement accentuée que dans une extension de 3,352 mètres que la ville a du levant au couchant, il y a une pente moyenne de 3½ mètres.

Les terrains de la vallée d'Orizaba appartiennent au cretacé supérieur (terrains à hippurites et à radiolites), composés en général de calcaires, alternant avec des marnes et des argiles; ils sont recouverts d'une couche de terre végétale variable, mince dans de certains endroits, comme, par exemple, au nord-ouest, mais présentant des qualités favorables à la culture.

Les modifications atmosphériques et les engrais que produisent les détritus des plantes répandues dans les champs ont fertilisé de plus en plus les terrains où séjournent les végétaux mêlés avec la terre qui leur sert de base, en augmentant dans certains lieux la couche de terre détritique. A proprement parler, il n'y a point de champs complètement stériles dans la vallée d'Orizaba.

Au nord de la ville plusieurs marais disparaissent graduellement, grâce à des travaux de canalisation.

Ce n'est pas sans raison que les aborigènes de la vallée d'Orizaba lui donnèrent le le nom poétique de "Ahauializapam," mot composé signifiant dans la langue expressive des anciens Mexicains: Gaîté dans, 'ou sur l'eau.'

En effet, il y a à Orizaba une infinité de sources qui fertilisent les terres. Grâce aux pentes des Cordillières et aux inégalités du sol, leurs eaux coulent impétueusement et se précipitent de très haut, offrant de puissantes chutes aux industriels qui les utilisent chaque jour d'avantage.

Parmi les cours d'eau les plus remarquables, citons le "Rio Blanco," qui prend sa source à 30 kilomètres en amont d'Orizaba, sur le versant de la montagne appelée "Cumbres de Acultzingo." Il s'enrichit d'autres tributaires qu'il reçoit dans sa source.

Ce ruisseau, un peu avant d'arriver à Orizaba, reçoit un autre affluent formé par les sources de "Nogales," qui charge ses eaux de produits calcaires, les rendant impropres aux usages domestiques et impropres à l'alimentation des chaudières à vapeur.

Ce ruisseau court au sud de la ville, du couchant au levant, et opère sa jonction avec le "Papaloapam," débouchant dans le Golfe du Mexique par la barre "d'Alvarado."

La rivière appelée "Rio de Orizaba" prend son origine dans les montagnes de "Fesmelaca," et dans son cours augmente son volume d'eau par les diverses sources qui surgissent des coteaux adjacents. Elle passe en serpentant par le centre de la ville qu'elle traverse du nord-ouest au sud-est, et va déboucher dans le "Rio Blanco" au sud-sud-est. De cette rivière aux eaux pures et limpides la plupart de l'année la ville s'alimente d'eau potable, et quoique chaque jour son débit diminue par suite du déboisement de nos coteaux et des nombreux emprunts que l'on y fait sans cesse pour les moteurs des fabriques et des moulins établis sur ses rives.

Le ruisseau nommé "Arroyo Caliente," qui traverse la ville au nord-est et jaillit

dans les marécages appellés "Tepetlaxco," fertilise une grande étendue de terrains qu'il croise pour aller se perdre dans le "Rio Blanco."

Au couchant du coteau "Cerro de Escamela," au nord-est aussi de la ville, naît un autre ruisseau, appelée "Ojo de Agua," qui sort aussi du versant du "Cerro de Escamela" à un mille d'Orizaba. Cette eau, toujours constante, pure, fraiche et abondante, possède, autre cela, les meilleurs conditions de l'eau potable, et serait la plus convenable pour l'usage des habitants de la ville,pouvant fournir 80 litres par personne et par jour.

Il y a un projet facile à réaliser qui probablement sera prochainement mis à exécution pour l'introduction de cette eau dans la ville.

Les vents qui dominent à Orizaba sont le nord-est, alternant pendant l'hiver et le printemps avec les violents vents du sud-ouest, en forme d'ouragans. Ces derniers sont secs, chauds et tellement impétueux que l'on croirait s'asphyxier quand ils soufflent, à tel point ils raréfient l'atmosphère. Ils exposent beaucoup aux hémoptysies et aux congestions cérébrales; mais en change ils sont grandement salutaires, parce qu'ils chassent au loin tous les germes d'infection et dessèchent convenablement l'air et les appartements. La température moyenne d'Orizaba est de 21° centigrades. Il tombe en terme moyen 2,500 mm. d'eau dans l'année.

La ville comptait, il y a trente ans, 22,000 habitants. Ce neuméro a doublé de nos jours.

En fait d'hygiène, la ville laisse beaucoup à désirer. Elle a assez d'eau de bonne qualité, mais les détritus organiques que la rivière d'Orizaba entraîne pendant la saison des pluies la rendent malsaine, et produisent fréquemment des catarrhes intestinaux.

Dans la partie nord-est de la ville, qui est la plus basse, on se sert de l'eau des puits. Cette partie que traverse "l'Arroyo Caliente," d'origine marécageuse, est celle qui a toujours lé plus souffert des maladies paludiques.

Jusqu'à il y a très peu de temps les latrines de la ville n'étaient en général que de fosses fermées, et aujourd'hui encore les maisons où l'on a établi les améliorations que réclame la bonne hygiène sont peu nombreuses. Il y a une huitaine d'années que l'on a commencé à construire des égouts souterrains dans quelques rues de la ville, pour recevoir les rebuts, eaux sales, ordures, matières fécales, etc.; mais ces égouts sont tellement défectueux qu'ils sont plutôt nuisibles à la santé qu'utiles.

Les rues de la ville sont étroites. Le pavage est incomplet et négligé. Les maisons, en général, sont humides, à l'exception de celles que l'on construit depuis peu d'années, mais avec le désavantage qu'avant elles étaient spacieuses et bien aérées; elles avaient des grandes cours converties en beaux jardins; on en bâti de moins humides, il est vrai, mais beaucoup plus réduites, avec des très petites cours et peu d'ampleur dans les appartements, au détriment des commodités et de la santé des habitants à cause de l'avarice des propriétaires.

On ne connaît point la misère à Orizaba. La vie y est relativement chère, et néanmoins aucun ne manque du nécessaire pour subvenir aux premiers besoins.

Les gens sont généralement propres et coquets, et se nourrissent assez bien. Les habitudes du peuple sont bonnes. L'ivrognerie était un accident fort rare parmi la basse classe jusqu'à il y a dix ou douze ans. Depuis que l'usage du "pulque" a été introduit dans la contrée, en même temps que les gens du plateau central y sont venue travailler aux fabriques à filature nouvellement établies, ce vice répugnant s'est enraciné, au grand préjudice de la population pauvre, qu'il plonge dans une misère physiologique, l'exposant aux maladies de tout genre dégradant et avilissant l'homme. Malheureusement, le vice dégoûtant de l'ivrognerie a aussi jeté des racines profondes dans la classe éclairée.

Il y a vingt ans, avant la construction du chemin de fer, les saisons étaient assez régulièrement marquées à Orizaba. Les pluies y étaient bien distribuées, les températures extrêmes y étaient à peu près inconnues, et le sol, autant que le sous-sol, conservait un dégré d'humidité qui donnait la constance aux sources d'eau. D'après

les calculs approximatifs on aurait abattu au Mexique pour la construction de chemins de fer 30 millions d'arbres, et pour alimenter l'insatiable ventre des locomotives on en aurait consommé 100 millions! En ajoutant à ces chiffres ceux qui se consomment dans les fabriques comme combustible les quantités de petits arbres que l'on reduits en charbon, le bois de teinture et de construction que l'on exporte tous les jours en si grandes quantités, le bois que nos menuisiers, charpentiers et ébénistes travaillent, on aura une idée de l'abattage effréné et nuisible que nos forêts ont souffert.

On calcule que les chemins de fer du Mexique consomment comme combustible 1,000 tonnes de bois par jour. Il ne faut donc pas s'étonner de ce que à Orizaba (et là sans doute moins qu'en d'autres endroits du pays, par suite de ses conditions particulières) la météorologique ait subi des changements aussi remarquables. Avec les pluies il tombe peut-être aujourd'hui la même quantité d'eau dans l'année qu'auparavant, mais celle qui tombe dans quatre ou six averses torrentielles tombait avant dans cinquante bien distribuées, et le manque d'arbres sur les cimes et les coteaux pour retenir la rapidité de ces eaux, donne lieu aux débordements et aux abondantes crues qui ravagent tout ce qu'elles trouvent sur leur passage, emportant la couche mince d'humus qui constitue la fertilité des terres, et inondant les bas-fonds, semant partout la désolation et la ruine. Nous avons eu deux ou trois de ces exemples dans les dix dernières années, tels que d'anciens octogénaires ne se souviennent point avoir jamais assisté à de pareils dégâts.

Par suite de cette coupe immodérée des arbres les sources qui approvisionnent la ville d'eau potable ont tellement diminuées qu'elle fait déjà complètement défaut. Les arbres qui ombrageaient le ruisseau formé par ces eaux de sources manquent, et l'évaporation a appauvri notablement leur volume. Autrefois, pendant presque toute la durée de l'hiver, les vents de l'est et du nord-est entraînaient les nuages suspendus sur la mer qui restaient, pour ainsi dire, accrochés au feuillage des arbres de nos bois, se condensant et se transformant en pluie fine que l'on appelait avec raison "la salud del pueblo." Dans ce temps là on ne voyait pas le soleil de quinze ou vingt jours, ce qui imprimait à la ville une teinte mélancolique. L'air était tellement saturé d'humidité qu'on aurait pu le couper au couteau; les brouillards constituaient l'état normal de notre atmosphère pendant tout l'hiver. On jouissait, il est vrai, de plus de santé, les inflammations des organes respiratoires n'étaient point connues et les fièvres intermittentes fuyaient, pour ne plus reparaître, jusqu'à l'été suivant. Les températures les plus basses étaient de 12 à 14° au-dessus de zéro.

Aujourd'hui, les étés sont brûlants et très prolongés. Les pluies parfois très rares dans certaines années sont torrentielles dans autres. Nous avons des hivers accompagnés des fortes gelées. Les températures extrêmes se succèdent souvent sans transitions lentes, notre ciel, autrefois couvert de nuages, laisse tomber d'aplomb, pendant des jours et mois entiers, les rayons du soleil sur la terre qu'il dessèche et qu'il gerce, anéantissant les germes de la végétation. Les plus médiocres ruisseaux se convertissent subitement en courants dévastateurs; et si une main puissante n'y porte pas remède au plus tôt nous courrons le grand risque de subir un jour le sort des départements alpins, où le sol disparaît sous les pieds de l'homme, et où les plus fertiles et riches contrées sont devenues des plaines arides et sèches et des tristes campagnes déserts.

Le paludisme, cette maladie infectieuse et spécifique, parasitaire, produite par la pullulation dans le sang des protozoaires, si bien décrits, il y a douze ans, par M. Laveran, règne depuis longtemps dans la vallée d'Orizaba, et d'après ceux de mes collègues qui ont exercé la médecine pendant les cinquante dernières années écoulées il était si bénin, il se présentait sous des formes si simples, qu'il ne préoccupait personne, et on le guérissait sans l'intervention de l'art. La faiblesse de l'empoisonnement ou de l'intoxication était telle, et peut-être aussi l'organisme de nos

ancêtres se trouvait dans de meilleures conditions générales que nous, qu'ils luttaient souvent avec avantage contre les parasites, sans employer aucun médicament spécifique.

On avait rarement besion d'administrer aux malades anémies, surmenés et mal nourris, deux ou trois doses de sulphate de quinine, 30 centigrammes au plus, pour se rendre maître de la maladie. Un bon régime et du repos diminuant l'anémie complétait le traitement. Les rechutes ne se connaissaient presque pas alors.

Les laboureurs des alentours de la ville, des villages ou plutôt des fermes situées dans les bas-fonds, dans les plaines humides, qui le plus souvent vivaient sur les bords fangeux des cours d'eau, isolés dans la campagne, près des marais ou des terres irriguées, allaient habituellement chercher les secours des médecins pour se soigner des "frios," comme l'on nomme vulgairement à Orizaba les fièvres intermittentes; et il n'était pas rare de voir disparaître la maladie par le seul changement de climat. De temps à autre il arrivait des cachectiques provenant des mêmes endroits, dont la cachexie ne se déclarait jamais d'emblée, si ce n'était qu'après une série d'accès intermittents ou continus.

Dans ces entrefaites survint l'année 1867, époque à laquelle les travaux de chemin de fer mexicain commencèrent à Orizaba, travaux herculéens pour lesquels il a fallu fouiller profondément la terre; et pendant l'automne de cette même année les fièvres paludéennes éclatèrent inopinément sous les formes les plus graves, constituant un des plus grands fléaux qui aient jamais affligé notre population, causant des désastres terribles, et occasionnant la mort de centaines d'individus, et assouvissant avec plus d'acharnement encore sur les travailleurs mêmes.

Deux ans après, j'arrivais à Orizaba. Le tiers des cas de maladies que je traitais étaient dû au paludisme sous la forme très aiguë du commencement. Mes collègues, qui étaient profondément épouvantés, appliquaient à temps la quinine par doses massives, et employaient déjà, comme un secours héroïque, les injections hypodermiques, essayées avec beaucoup de succès en 1868 par les professeurs Talavera, Mesa et Fernandez. On employait le bi-sulphate de quinine additionné d'acide tartrique, et on faisait des injections dans le dos. Il survenait assez souvent des abscès ou des eschares sur la peau.

Sans ces secours nous aurions perdu la plupart de nos malades, parce qu'il y avait de cas où présentaient sous de formes très graves des accidents pernicieux procédant uniquement de l'infection palustre, qui amenaient rapidement la mort avant l'absorption lente de la quinine par les voies digestives.

Au moins pendant huit ans consécutifs nous eûmes la même constitution médicale. Il n'y avait pas une maladie quelle qu'elle fût, où le paludisme ne se greffasse pas, en la compliquant et l'aggravant toujours. Ce fut alors que je vis les cas les plus caractéristiques de typhus malarien et de "typhoïde malarienne," dont je parlerai après. Ce fut alors aussi que j'ai eu l'occasion d'observer le paludisme sous toutes les formes que nous décrivent si bien Laveran et Fernand Vidal.

La maladie s'acharnait dans les quartiers bas et humides de "Santa Gertrudis," "Tepatlaxco" et "La Concordia," qui sont arrosés par le ruisseau "Arroyo Caliente."

Les logements de ces quartiers sont très mauvais et habités par les gens les plus pauvres, et par conséquent ils se trouvent dans les meilleures conditions pour faire pulluler les germes infectieux de toute maladie quelle qu'elle soit. Pour éviter les fréquentes récidives et les rechutes, nous faisions déménager les malades dans les quartiers élevés de la ville, où le paludisme n'a jamais fait autant de ravages que dans les quartiers bas.

Pendant huit ou dix ans nous avons eu le paludisme comme maladie saisonnière. L'endémie apparaissait aux mois de mai et juin, et affectait la forme endémo-épidémique au mois d'octobre après les grandes pluies, époque à laquelle les chaleurs provoquent les fermentations du sol marécageux, et développent les miasmes palustres. Quand à la pluie abondante succédait ces coups de vent impétueux du sud-ouest, qui amenaient la sécheresse et produisaient l'évaporation du sol, la maladie

éclatait tout de suite. Les premiers cas de fièvre de première invasion se présentaient au printemps. Pendant cette saison les formes dominantes étaient les rémittentes et les continues.

Les quotidiennes et les tierces étaient de préférence les formes de l'automne. Le type quart était très rare et résistait à la médication spécifique; et lors que nous l'avions il se présentait toujours en hiver, prouvant ainsi l'influence de la chaleur sur le rapprochement des accès et sur la tendance à la continuité.

Plus l'individu était intoxiqué, et par conséquent plus sujet aux récidives, plus il avait de prédispositions au type de paroxysmes éloignés; et au contraire, plus était grande son immunité, plus chez lui la tendance aux types d'accès très rapprochés ou continues, était moindre.

Nous observâmes alors toutes les formes que plus tard j'ai trouvé si bien décrites par Laveran, Fernand Vidal et tant d'autres; depuis la forme bénigne et franche jusqu'à la sidération pernicieuse aucune n'a fait défaut.

Parmi les formes continues graves nous avions fort souvent la typhoïde palustre, entièrement semblable à la typhoïde vulgaire. Le malade était plongé dans un état typhoïde ou de stupeur grave; la fièvre était irrégulière, parfois sans rémission, parfois avec rémission vespérale, terminant brusquement par une crise, ou par la mort, avec des accidents pernicieux redoutables. D'autres fois c'était la forme bilieuse, et nous savons bien quelle est l'importance des phénomènes biliaires, et quel est le caractère frappant qu'ils ont dans la pathologie tropicale des fièvres de toutes formes.

Il n'était pas rare de voir parmi les formes pernicieuses quelques unes qui se compliquaient d'entérorragies indomptables qui tuaient presque toujours les malades. Cette forme s'annonçait constamment par des taches purpuriques et des grandes ecchymoses à la peau de bras et des jambes. Parmi les formes pernicieuses que j'ai eu occasion d'observer à Orizaba (celles que Torti appelle fièvres *comitées*, dans lesquelles un des phénomènes morbides prédominait constituant tout le danger) les plus saillantes étaient celles à accès comateux diaphorétiques, délirantes et surtout les cholériques dont les celles avaient parfois l'aspect riziforme typique.

Les accidents pernicieux éclataient même chez des individus bien portants qui jamais n'avaient été atteints de paludisme; ou se produisaient pendant le cours d'une fièvre intermittente ou continue, mais si brusquement que toute prévision était déroutée. Souvent ils se déclaraient aussi sans fièvre, et alors les cas étaient des plus graves.

Chez les enfants la forme éclamptique dominait. Les cas étaient toujours très graves, et sans la prompte intervention de la quinine ils étaient toujours mortels.

Par moments nous nous trouvions en présence de ces troubles non fébriles qui reviennent périodiquement, dans le fonctionnement des organes, que l'on appelle formes larvées, et se guérissent par la quinine. Parmi ces formes les métrorragies et les pseudopneumonies, qui cédaient rapidement à la quinine, éveillèrent mon attention à cause de leur fréquence et de leur gravité.

A cette époque je vis la cachexie palustre survenir d'emblée ou à la suite d'un premier accès de fièvre. Les Indiens qui restaient dans les bas-fonds, qui se nourrissaient mal et se livraient à des excès alcooliques, étaient souvent attaqués d'une façon que l'on pourrait appeler "galopante." Cette cachexie résistait au meilleur traitement institué, et les malades succombaient irrémissiblement, enlevées par une maladie aiguë, comme la dyssenterie ou la pneumonie, d'une gravité d'autant plus portée à l'extrême chez ces gens là à cause des mauvais terrains dans lesquels elle évoluait, ou victimes de la tuberculose dans ses multiples manifestations.

Les cachectiques étaient contraints de quitter les régions insalubres, et malgré cela ne réussissaient à se guérir qu'à grande peine.

Je ne laisserai point passer inaperçu un fait fort curieux que nous avons observé assez fréquemment pendant les endémo-épidémies. La maladie s'acharnait, comme je l'ai déjà dit plus haut, dans les quartiers bas et malsains, et quand elle étendait sa sphère d'action aux quartiers élevées elle limitait toujours ses invasions aux

maisons situées dans les rues larges, exposées aux vents dominants venant des lieux infectés. Les rues étroites, abritées du vent, paraissaient être garanties contre l'invasion des miasmes générateurs des fièvres.

Dans les quartiers les plus élevés de la ville, qui sont aussi les plus populeux, le paludisme a toujours fait moins de ravages.

Dix ans après s'être stationné à Orizaba le paludisme, avec ses exacerbations endémiques et épidémiques, est venu en perdant sa force graduellement à un tel point qu'aujourd'hui — je ne dirai pas qu'on ne le trouve plus sous ses formes aiguës, avec leurs types variés, et leur intensité différent depuis la fièvre dite larvée jusqu'à la rémittente et, très extraordinairement, la pernicieuse — mais je dirai qu'elles sont de plus en plus clair-semées et sans gravité; et que les formes chroniques, avec leurs complications viscérales et organiques, sont aussi déjà excessivement rares, quoiqu'il soit de grande notoriété que l'intoxication tellurique imprime une physionomie spéciale dans nos contrées aux différents états morbides dont pâtissent les habitants. Dans toutes les maladies zymotiques, dans les affections saisonnières et même dans les traumatismes, on trouve presque toujours des paroxysmes réguliers, certaines allures particulières qui témoignent assurément d'une influence spécifique propre à la région. Le traitement apporte comme un critérium définitif et indisputable, et prouve que chez nous la quinine constitue le panacée du pays, le palladium souverain.

Il ne nous reste que ce que nous pourrions appeler la constitution médicale, mais les véritables endémies ou épidémies, que l'on peut considérer comme l'expression la plus achevée de l'intoxication paludéenne, qui désola pendant quelques années nos contrées, et produisant une mortalité considérable; celles-là ont disparu. A quoi donc pouvons nous attribuer cette amélioration? Il est vrai que l'on a desséché les marais que nous avions aux environs de la ville. Il est vrai aussi que la culture de la terre s'est étendue notablement à la suite de la hausse dans le prix du café, et surtout comme résultat de la paix dont nous jouissons, heureusement, depuis seize ans. Ce sont certainement des facteurs importants dont il faut tenir compte, mais il y en a aussi d'autres non moins intéressants.

Il faut d'abord se souvenir que les marais n'ont pas été la cause efficiente des premières irruptions, ni des manifestations aiguës du tellurisme à Orizaba.

Nous avions de vastes étendues de terrains marécageux depuis de temps indéfinis, et cependant la grande intoxication n'est née qu'avec les grandes défrichements, les grandes remuements de la terre, faits pour les travaux du chemin de fer. Nous étions dans de magnifiques conditions pour la culture du microbe de Laveran, mais nous n'avions pas la semence que nous a fournie la terre remuée, la terre qui peut renfermer le germe toxique dans des conditions très variables, sur lesquelles la lumière n'est pas encore faite, et que les études micro-biologiques autant que les recherches minutieuses sur l'étiologie contribueront à éclaircir.

"L'existence des marais n'est pas, proprement parlant, nécessaire au développement des fièvres," dit Laveran, et nous pouvons aussi dire qu'avec des grandes étendues marécageuses on peut avoir des contrées indemnes de fièvre.

Nous avons des villes lacustres dont les conditions caractéristiques sont l'humidité, les brouillards, la chaleur et l'influence palustre. Venise, par exemple, dont le golfe est sillonné de canaux marécageux, et Venise est remarquable par sa salubrité, et l'immunité dont elle jouit contre toute apparence au point de vue des fièvres de marais. "Cette innocuité au profit de la ville est si connue," dit Ed. Carrière, "que les malades s'y rendent pour changer d'air et de se débarrasser, en y vivant dans des conditions nouvelles, des accès contractés sur d'autres points." La condition d'eau stagnante n'est donc pas nécessaire pour la production des miasmes palustres.

Le remuement du sol a eu lui-même une influence fébrigène (Fonssagrives). Lind nous dit que dans les pays chauds des matelots envoyés à terre pour y creuser une fosse sont souvent pris d'accès simples ou pernicieux.

Les fièvres d'accès sont devenues plus communes à Paris depuis les grands tra-

vaux qui ont métamorphosé cette belle ville. On a vu éclater la malaria à Paris en 1811, lorsqu'on creusa le canal Saint-Martin. Elle éclata aussi en 1840, lors de la construction des fortifications.

Avignon a vu une épidémie de fièvres pernicieuses se manifester à la suite de grands travaux d'excavation.

Mais, à quoi bon multiplier les exemples pour confirmer un fait avéré que tout le monde scientifique connaît. C'est pour cela que Pepper propose de faire disparaître du langage scientifique les appellations si diverses de fièvre paludéenne, palustre, intermittente, d'impaludisme, de paludisme, de malaria, de tellurisme, et de n'avoir qu'un terme pour exprimer cette chose unique: l'intoxication par un agent spécifique, répandu dans le sol, sec ou humide, palustre ou non, et dont seulement les formes et les modalités sont variables, suivant l'intensité de sa diffusion, les conditions de son absorption, et le milieu organique où il fait élection de domicile. Pepper propose l'expression "Aérotellurisme protéiforme," comme étant, dit-il, le mieux en rapport avec les connaissances actuelles de la science, ne préjugeant ni un symptôme inconstant et même jusqu'à l'origine exclusivement marécageuse ou alluvionnique, ni le caractère essentiellement variable de ce symptôme, et conservant une sage prudence sur la nature, le rôle exclusif, spécifique ou prépondérant d'un micro-organisme ou des micro-organismes, incriminés dans une question aussi complexe de genèse et d'étiologie.

Pourquoi les effets terribles de l'impaludisme se sont-ils prolongés avec ce caractère à Orizaba? Premierement, parce que notre sol vierge était constitué par les détritus d'une foule de générations de végétaux très riches en conditions propres à produire en grand le miasme palustre. En suite, parce que nous avons les meilleures conditions de culture de micro-organismes, marais, chaleur, humidité, etc.; et finalement, parce que pendant les huit ans qu'a duré l'endémie faisant ses ravages nous étions en pleine guerre civile, la ville a été constamment fortifiée, on faisait de fréquents remuements de terre, les fosses étaient remplies d'eaux chargées de matières organiques en complète décomposition; et comme complément l'affaiblissement de notre race par l'ivrognerie et autres vices également spoliateurs. A part cela, il ne faut jamais oublier que la génération, qui se trouve aujourd'hui dans toute la plénitude de la vie, a eu pour générateurs des gens qui ont vécu à une époque où le paludisme se trouvait dans toute sa force, et que beaucoup d'eux, étant cachectiques, ne devaient point se trouver dans les meilleures conditions pour engendrer une progéniture saine, robuste et vigoureuse.

Les ravages du tellurisme à Orizaba ont été réduits à leur expression minime, parce que les marais, que nous pouvons pas appeler les "générateurs," mais bien "les conservateurs," du miasme tellurique, ont été restreints dans des limites plus étroites par les barrières que leur imposent la civilisation et la densité de la population. L'homme dispute chez nous, comme partout ailleurs, sa vie, ses forces et sa fécondité aux influences paludéennes. Les cultures aussi ont beaucoup contribué à cette amélioration. Les cultures chassent la malaria d'un pays, dit Laveran. Les arbres et les plantes, dit le même auteur, assainissent le sol en le drainant et en le desséchant bien plus tôt qu'en mettant en œuvre sa puissance végétative, et les cultures ont été très étendues dans la vallée d'Orizaba; mais ce ne sont pas là les seules et principales raisons, et il est juste aussi de reconnaître qu'à cet heureux résultat ont également contribué les habitudes nouvelles qui, peu à peu, s'introduisent chez nous, l'amélioration du logement et de la nourriture, les vêtements meilleurs, l'instruction plus répandue, moins de routine et de sots préjugés . . . . Les paysans, réfractaires avant à la quinine, la gardent aujourd'hui parmi leurs meilleurs médicaments et la prennent ou la donnent aux leurs aussitôt qu'ils se croyent envahis par l'aérotellurisme protéiforme.

Relativement au traitement que nous suivons dans le cas de formes aiguës d'intoxication tellurique j'aurai peu de chose à dire. Quand nous pouvons compter sur l'absorption par les voies digestives, et que nous ne sommes pas pressés par l'acuité

des symptômes ou par quelqu'accident insolite, de ceux qui donnent de la gravité à la maladie, et mettent en danger la vie du malade après un purgatif ou un vomi-purgatif si l'état saburral de l'estomac l'exige, nous administrons le remède héroïque par excellence, la quinine. Dans les formes continues, deux ou trois grammes dans la journée associée à l'antipyrine, jusqu'à faire descendre la température; et quand la fièvre prend la forme intermittent, alors nous soutenons l'action de la quinine en l'administrant le plus possible avant l'heure périodique des accès. Dans les formes graves solitaires ou comitées on court un grand risque en ne profitant pas la rapide et sûre absorption par la voie subcutanée. Au commencement, comme je l'ai dit ci-dessus, nous employions le bi-sulphate de quinine additionné de l'acide tartrique, pour mieux la faire dissoudre, et nous faisions les injections dans la peau du dos ou des bras.

Ces injections étaient très douloureuses et déterminaient souvent des abcès et des eschares. Quand nous avons eu le bromhydrate acide de quinine, nous le préférions comme étant plus soluble, moins douloureux et apportant moins d'accidents locaux; mais pour réussir il fallait augmenter la dose d'un 50 pour cent. Aujourd'hui nous donnons la préférence au bi-chlorhydrate ou au chlorhydro-sulphate, très soluble et très riche en quinine. Nous faisons les piqûres dans les fesses, en introduisant profondément l'aiguille dans ces régions très riches en tissus cellulaires sous-cutanés, prenant bien garde à ce que la solution soit bien claire, tiède et qu'elle ne tienne jamais rien en suspension, ayant aussi le soin de bien nettoyer et désinfecter l'aiguille avant de s'en servir. Avec ces précautions les accidents deviennent très rares.

J'ajouterai un mot sur la manière de traiter les formes éclamptiques des maladies chez les enfants, qui nous a toujours donné des résultats splendides. Ces formes, accompagnées de grandes hyperthermies, et parfois rapidement mortelles, réclament des secours soudains que nous faisons connaître de suite aux familles. Aussitôt que possible, plonger le petit malade dans un bain tiède (30 à 35° centigrades), affusions d'eau froide à la tête. Si les convulsions ne cessent pas, faire prendre des inhalations de chloroforme, appliquer des injections de quinine à doses proportionnés à l'âge du malade.

Quand nous sommes sûrs de l'absorption et de la pureté du sel quinique employé, et nous observons que la fièvre se montre rebelle malgré l'application de 5 ou 6 bonnes doses, nous trouvons de l'avantage à ne plus insister sur l'administration du spécifique; nous laissons la quinine de côté, et la fièvre ne revient plus.

Nous savons assez que beaucoup de personnes présentent de véritables idiosyncrasies à l'égard de la quinine, et que la moindre dose de ce médicament leur cause de pénibles urticaires et eczémas très aiguës et de grande durée, et quelque fois des accidents de plus grande importance. Eh bien, chez ces mêmes personnes la quinine en injections hypodermiques ne produit pas la moindre de ces manifestations-là.

Comme prophylactique pour les personnes qui vivent dans des lieux palustres, ainsi que pour éviter les rechutes ou récidives, l'hydrothérapie et l'acide arsénieux m'ont toujours donné les meilleurs résultats; et pour les malades très anémiques qui ne pouvaient pas quitter les lieux malsains je n'ai eu qu'à me louer de l'emploi de l'excellente formule suivante, recommandée par le professeur Baccelli, de Rome:

Tartrate double de terre et potasse	grammes..	12
Acide arsénieux	centigrammes..	10
Bi-sulphate de quinine	grammes..	2

Pour faire cent pilules, à prendre de huit à dix dans la journée au besoin. Avec l'usage de ces pilules, aidées de l'hydrothérapie, j'ai vu disparaître en peu de temps, et comme par enchantement, l'anémie, la bouffissure du visage et des extrémités, le teint blême, quelques fois livide, les grosses viscères, rate et foie, la faiblesse générale, la perte de l'appétit et de l'énergie vit ale, et, en un mot, tous les symptômes qui caractérisent l'intoxication chronique.

Au sujet des formes combinées, anciennes, proportionnées ou compliquées du palu-

disme, je veux m'occuper seulement du typho-malarien et de la typhoïde malarienne. Je tiens à faire cette distinction des formes parce que en effet ce sont deux choses entièrement différents.

Sous le nomme du typho-malarien j'ai toujours vu décrire le mélange du paludisme avec la fièvre typhoïde, et c'est pourquoi il me semble que cette dénomination induit en erreur, et comme le paludisme complique souvent l'une et l'autre des dites fièvres et forme des entités morbides parfaitement caractérisées, il m'a paru convenable de désigner chacune d'elles par un nom qui rapelle la combinaison dont il est question, réservant le nom de typho-malarien au typho-exanthématique associé au paludisme, et celui de typhoïde malarienne à la fièvre typhoïde compliquée du paludisme. Mais avant tout je vais dire quelques mots sur la modalité de ces grandes pyrexies dans la vallée d'Orizaba.

J'ai entendu dire par mes anciens collègues qui exercent la profession médicale à Orizaba depuis longtemps, qu'ils ont vu de temps à autre le typhus exanthématique se présenter plus souvent que la fièvre typhoïde, mais n'ayant jamais les allures endémiques et encore moins les épidémiques. J'habite Orizaba comme médecin depuis deux ans après l'éclosion des formes graves du tellurisme dans la vallée en 1867. Depuis cette époque je me suis souvent trouvé en présence de ces formes qui caractérisent si bien ces deux pyrexies, mais c'était toujours dans de cas isolés qu'elles apparaissaient accidentellement dans l'évolution saisonnière de la chaleur sans acquérir droit de domicile et ne jouant que le rôle d'épisode ou d'incident passager.

Quand dans les contrées du plateau central, et surtout dans la capitale du Mexique, une de ces terribles épidémies de typhus éclatait et faisait tant de ravages parmi la population, nous avons eu à Orizaba des cas isolés, quelques fois très graves, mortels, qui se présentaient comme d'origine spontanée, génération *a novo*, comme Murchison appelle cette origine indépendante du typhus, mais sans les conditions que demande cette espèce de génération, telles que l'accumulation d'individus en état de grande malpropreté et de défaut ou manque d'aération pour ces individus agglomérés et sans pouvoir attribuer non plus la génération du poison aux émanations concentrées d'êtres humains sales de corps et porteurs de vêtements malpropres. Comme les idées contemporaines s'accordent très mal avec cette hypothèse de génération *a novo*, et qu'il est delicile de comprendre, selon ces idées, comment le germe du typhus peut se créer de toutes pièces, il faut donc croire de deux choses l'une: ou que l'on a méconnu l'apport primitif, ou que nous ne savons encore que très peu de choses concernant l'agent pathologène du typhus, et par conséquent sur sa manière de naître et de se propager. A Orizaba le typhus revêt certains caractères très spéciaux qui méritent d'être connus. Depuis huit ans cette maladie nous fait ses visites sous la forme endémique. Elle n'est contagieuse à aucun dégré, ni par le contact direct du malade, ni par celui des objets qu'il a souillés; pour le reste elle se comporte dans ces manifestations cliniques entièrement d'accord avec les descriptions fidèles que nous devons aux travaux de Perry, Gerhard, Lombard, Valleix et Rochoux, Barlow et Stewart qui établissent si bien l'autonomie de cette fièvre.

J'ai dit qu'avant les huit dernieres années les cas de typhus étaient rares et n'apparaissaient pas sous la forme endémique. Le cas de cette nature n'eûrent lieu qu'après la construction des premiers égouts, dont j'ai parlé plus haut, lesquels ne remplissent pas les conditions que l'hygiène moderne réclame. Depuis une huitaine ou une dizaine d'années la population de la ville d'Orizaba est devenue plus dense, plus encombrée. Cette augmentation s'est produite surtout depuis la venue d'un grand nombre de personnes descendues du plateau central pour travailler aux fabriques de tissus qui ont été établies récemment aux environs de la ville; et comme en général ces ouvriers sont des gens malpropres, on commence déjà à noter dans quelques endroits populeux, tels que les maisons citées, cette odeur fetide spéciale que l'on sent dans ces bouges qui abondent à Puebla et à Mexico.

"On peut faire naître le typhus à volonté. On n'a pas besoin de l'apport primi-

tif du germe typhique pour le développement épidémique du typhus," dit Murchison. Je ne sais pas jusqu'à quel point cette assertion pourrait être vraie; mais s'il est difficile de trouver la cause première, si elle nous échappe encore, il est tout à fait hors de doute que les plus sérieuses épidémies éclatent où il y a agglomération, et avec le manque d'aération, c'est un des plus énergiques moyens de diffusion. Il est bien prouvé aussi que la misère exerce une influence manifeste sur la prédisposition au typhus. C'est pour cela qu'il a été surnommé "la maladie des faméliques et des misérables."

Il y a de huit à dix ans que nous avons à Orizaba les égouts et de l'encombrement. Nous n'avons pas encore la misère, quoique nous ayons déjà la gêne; mais elle viendra plus tard, comme l'apanage de toutes les villes industrielles.

Or, nous avons les causes de la génération, quoiqu'elle nous soit inconnue, et les plus énergiques moyens de diffusion; donc il est vrai que nous avons aussi les foyers de l'endémie. Jusqu'à présent les cas qui se sont présentés ont été isolés, clairsemés dans la ville, mais ils se sont produits dans les maisons qui se trouvent dans le voisinage des égouts et quoique elles soient habitées par des gens de la classe élevé, la maladie n'a pas moins fait payer un tribut sensible aux habitants. Dans cette classe, comme dans l'autre, je n'ai jamais observé que la propagation eût eu lieu par contagion.

C'est pendant l'année dernière seulement que j'ai pu remarquer quatre cas qui se sont présentés dans l'intervalle de trois mois, chez des personnes aisés, et je suis encore à me demander si les habitants de cette maison ont été empoisonnés par le même foyer d'infection, ou s'ils se sont communiqués la maladie par contagion. Il s'agissait de la famille d'un des riches épiciers de la ville, dont le magasin, les entrepôts et les caves malpropres sont dans le même bâtiment où se trouvent aussi les apartements; et dans la rue, devant la maison, tout près aussi des logements, il y a un de ces égouts infectes où viennent aboutir traversant la cour, les immondices de la cuisine, de la basse-cour et des latrines, malproprement entretenues. Eh bien, il s'est produit un fait de plus curieux: les personnes qui administraient les soins aux malades, et celles qui étaient en contact immédiat avec elles, furent précisément celles que la maladie épargna, ce qui prouve évidemment l'absence de toute probabilité de l'existence de la contagion. Il arrive de même avec les malades qui viennent à Orizaba attaqués du typhus, provenant de Mexico, de Puebla, de Guanajuato et de tant d'autres villes de l'intérieur du pays où cette maladie règne sous des formes épidémiques plus franches.

Moi-même j'ai pris le typhus dans la capitale en 1883. J'ai attrapé une des formes les plus graves. Aussitôt que je me sentis malade, je me fis transporter à Orizaba, pour m'y faire soigner au soin de ma famille. Je fus en grand danger. J'échappais miraculeusement. Il est vrai que l'on prit les plus grandes précautions de propreté et de ventilation; mais aucune de personnes qui m'entouraient ne ressentirent absolument aucun mal, ni la maladie non plus ne fut transportée dans d'autres maisons, malgré les visites réitérées que je recevais de mes nombreux amis et de mes clients.

Un de mes collègues qui me soignait tomba malade; il eut une fièvre que l'on disait avoir été prise par contagion. Il n'en fut rien. La fièvre était tout simplement une rémittente paludéenne très bien caractérisée.

Ces traits nous disent assez éloquemment, que le typhus exanthématique se diffuse ordinairement avec une grande rapidité, quand il trouve de conditions à propos pour faire repulluler ses germes quels qu'ils soient; mais si, comme on le dit, il était si contagieux, on ne pourrait point s'expliquer les cas que nous observons à Orizaba.

La scarlatine, la grippe, la rougeole, la variole et la coqueluche, par exemple, à peine nous arrive-t-il un malade de Véra Cruz, de Mexico, de Puebla, etc., atteint d'une de ces maladies-là qu'elle se propage immédiatement malgré les meilleures précautions que l'on prend pour isoler les premiers attaqués, comme dans le cas de maladies nettement contagieuses.

Lorsque nous avions le paludisme à Orizaba sous des formes très aiguës, j'ai pu

observer les cas les mieux accentuées de cette forme combinée que j'appelle le "typhus malarien," et alors j'ai pu apprécier aussi l'influence pernicieuse que le miasme tellurique exerce sur la marche et sur la gravité du typhus exanthématique.

Si le typhus attaquait les cachectiques, ceux-ci succombaient presque irrémissiblement, les forces de leur organisme étant trop affaiblies pour pouvoir lutter victorieusement contre un enemi semblable.

Quand le poison tellurique opérait sa première invasion, en même temps que le germe typhique, on sentait de suite son influence par l'aggravation subite.

On craignait que les malades moursissent dans la période prééruptive et quelques uns succombaient en effet, telle était l'hyperthermie, 42° et parfois 42½° au soir, telle était l'action foudroyante exercée sur le système nerveux, telle était l'entrave opposée aux procédés ordinaires de défense de l'organisme par la présence dans le sang des toxines élaborées par l'infection paludéenne; le délire, l'excitation bruyante jaillissait bientôt, du quatrième au cinquième jour, remplacée peu après par le coma; les douleurs dans les membres et la rachyalgie étaient épouvantables. L'éruption se présentait aussitôt après le cinquième ou sixième jour abondante, de couleur très foncée et prenait rapidement la teinte purpurique, c'étaient de véritables taches échymotiques; le foie et la rate surtout, extraordinairement agrandis; de copieuses et indomptables épistaxis et entérorhagies se présentaient souvent, l'urine était chargée d'albumine . . . Et quand l'intervention de l'art avec la quinine se faisait sentir, ou quand l'organisme vaillant résistait à cette double et formidable attaque, quelle convalescence si pénible! Point de ces passages rapides des symptômes des plus défavorables aux symptômes de bon augure, qui caractérisent le typhus simple. . . . quelle destruction de l'organisme! . . . Quelle séquelle longue et fâcheuse. . . .

Ce fut alors que j'ai pu trouver les spécimens les mieux accentuées d'aphasies, d'hémiplégies, de monoplégies faciales, de toute sorte de paralysies localisées temporaires, il est vrai, mais pas moins pénibles et traînantes. Quelles cachexies si plaines d'entraves et si difficiles à dompter après la profonde atteinte soufferte par l'organisme par ce redoutable mélange de ces deux germes infectieux!

Par bonheur à mesure que le miasme urbain prend droit de domicile à Orizaba, le tellurisme perd graduellement sa force, se replie à la campagne et redevient rural comme ci-devant, et maintenant, comme il arrive du reste avec toutes les autres maladies, à peine si le typhus prend les allures que lui imprime notre constitution médicale.

Aujourd'hui le typhus commence par une fièvre intermittente qui devient continue, avec l'intervention de la quinine, et, parfois, aussi sans elle. Le typhus suit alors son évolution naturelle bénin ou grave, selon le terrain, selon le milieu où il se développe et selon la virulence du germe. Quand le processus typhique est terminé on se rappelle qu'il était associé au paludisme par l'intermittence qui revient, mais doucement, et qui cesse avec facilité au traitement spécifique, ou parfois avec la restoration des forces seulement. A cette heure nous pouvons dire que le tellurisme sert d'avant-garde, d'escorte et d'arrière-garde au typhus, mais sans l'aggraver beaucoup, parce qu'il est domptable, et ceci prouve sa bénignité.

Comme on le voit par le tableau que je viens de tracer, dans les cas très graves les accidents sont mixtes, mais dominant dans la première période ceux qui sont dus au tellurisme.

Dans la deuxième période, quand l'organisme seul, ou aidé par la médication spécifique, arrive à triompher, alors ce sont les symptômes typhiques qui prédominent, mais notablement aggravés par l'extrême faiblesse du malade, par sa résistance notoirement diminuée à la suite de l'empoisonnement paludéen.

A la fin, dans la convalescence, il semble que le prétendu "parasite du typhus" laisse de nouveau le champ libre au microbe de Laveran, qui était comme assoupi et qui se réveille, prenant prise sur un corps en ruine, sensible et délicat, lui causant de grands dégâts dus plutôt qu'à la vitalité du microbe à la faiblesse de

résistance et d'énergie du pauvre organisme, où le terrain est plus apte à la végétation et où le phagocytisme est mourant et n'existe presque plus.

Nous devons nos meilleurs triomphes aux opportunes injections hypodermiques de quinine, comme s'il s'agissait d'une forme pernicieuse maligne associée, ou suivie, d'un traitement symptomatique du typhus qu'est si bien connue.

Mais je dois faire mention spéciale des injections d'arséniate de quinine, que j'ai pour habitude d'appliquer journellement depuis le commencement à la dose de 3 à 4 milligrammes distribués dans la journée, avec les meilleurs résultats. On voit palpablement l'organisme se refaire sous l'action de ce médicament. Sans doute les cellules se trouvent plus aptes à combattre le virus, plus aptes à supporter le double empoisonnement, et comme protégées contre les nouvelles sources d'infection et d'intoxication qui prennent leur naissance dans les auto-infections qui occasionnent les fermentations anormales des intestins.

Comme la fièvre typhoïde se présente très rarement dans la vallée d'Orizaba, je ne puis dire grand chose tant sur les modalités que la localité lui imprime, que sur l'influence qu'exerce sur elle le poison tellurique, donnant naissance à cette infection combinée qui résulte du développement simultané de deux germes chez le même individu. Cette association morbide, si bien étudiée par Laveran parmi les troupes françaises en Algérie, et aussi par M. Woodward au sujet des armées opérant dans la vallée du Mississipi pendant la guerre de "sécession," à reçu le nom de "typho-malarien," que j'ai voulu changer pour celui de "typhoïde malarienne," pour éviter les confusions.

Dans les cas types que j'ai pu observer de la typhoïde malarienne, le rôle principal dans l'association, dans la première période appartenait presque toujours au paludisme, modifiant ou aggravant la marche du processus typhoïde, se dérobant après pour reparaître à la terminaison de la dothienenterie qui se faisait souvent par des crises.

Au commencement, comme dans le typhus malarien, il était fort difficile de diagnostiquer la forme typhoïde. Elle commençait comme une véritable fièvre intermittente à types quotidienne ou double-tierce, dont les accès se modifiaient, mais ne disparaissaient pas, sous l'action de la quinine; moins forts, mais de plus longue durée, les accès devenaient subintrant, et à la fin la fièvre se faisait continue; mais en pleine continuité, en plein cortège, des symptômes typhoïdes, l'intoxication palustre se traduisait sans cesse par les allures irrégulières de la fièvre, les rémissions brusques qui se faisaient extraordinairement le soir, les gonflements très douloureux de la rate et la profusion de sueurs qui amenaient le pauvre malade jusqu'au collapsus.

Comme on devait l'attendre, la pernicieusité dans les cas graves prenait rarement la forme solitaire, résultant de l'ensemble des troubles morbides; presque toujours elle était comitée; c'est à dire, qu'un des phénomènes morbides prédominait. Dans la première période c'était ceux du paludisme, et dans la deuxième et troisième période ceux de la fièvre typhoïde. Dans la première période l'hyperthermie, les sueurs profuses, le délire et le coma constituaient le danger; de la deuxième en avant, la diarrhée, les hémorrhagies de tout genre, et les perforations intestinales étaient à craindre.

La convalescence de la typhoïde malarienne, étant plus longue que celle du typhus malarien, mais à mon avis moins pénible et moins grave, malgré la durée de la fièvre qui se prolongeait pendant vingt-huit jours, et même plus. Un des phénomènes très curieux que j'ai observé fréquemment dans la typhoïde malarienne c'est le ralentissement du pouls, malgré les températures élevées, 40° et 41°, il n'était pas rare de ne compter que 70 à 80 pulsations. Ces cas étaient habituellement fort graves. Les taches rosées, l'éruption péculière de la fièvre typhoïde, quoique très fugaces dans quelques cas, nee manquait jamais dans la typhoïde malarienne, et apparaissaient souvent à la fin du premier septénaire. Comme complication fréquente de la typhoïde malarienne, j'ai vu la myocardite infectueuse, se manifestant par sa série

d'accidents connus depuis les simples modifications dans le bruit et le rhythme du cœur jusqu'au collapsus algide mortel; et comme infection secondaire, j'ai vu la typhoïde malarienne être suivie de l'infection purulente, et chez les enfants de la gangrène de la bouche.

La fièvre typhoïde n'a jamais revêtu chez nous ni la forme endémique ni l'épidémique; et quand par hasard elle s'est présentée dans ces derniers temps à Orizaba, combinée du paludisme, celui-ci la masque et la modifie, mais ne l'aggrave pas extraordinairement, comme dans les années où nous avons eu l'impaludisme aiguë. Comme on le conçoit et le savent très bien, les médecins qui exercent leur profession dans les climats comme celui d'Orizaba, entre les formes les plus simples et les plus graves de la typhoïde malarienne, sont comprises toutes les intermédiaires, toutes les graduations que peuvent déterminer la plus grande ou la plus faible virulence des germes mêlés, la saison où elles se présentent et l'idiosyncrasie, la vigueur, la résistance, et mille autres conditions de l'individu chez qui elles se développent.

Décrire chacune de ces formes serait une tâche impossible et peut-être sans objet, dans un ouvrage comme celui-ci.

Dans le traitement de la typhoïde malarienne j'ai suivi la ligne de conduite exprimée à propos du typho-malarien, et dans les deux formes combinées j'ai toujours obtenu d'excellents résultats de l'hydrothérapie tiède (méthode Bouchard), moyen précieux pour faire perdre du calorique au malade, sans chocs nerveux, sans spasmes des vaisseaux cutanés.

Voilà l'histoire du paludisme et ses combinaisons avec la fièvre typhoïde et le typhus dans la vallée d'Orizaba, que je voulu faire à grands traits, avec la crainte toutefois d'avoir dépassé les limites que ce genre de travaux impose.

Je répète que je n'ai pas la prétention d'avoir dit quelque chose de nouveau, mais je crois que les faits que j'ai rapportés, rigoureusement constatés, peuvent être de quelque importance, ne serait-ce que pour aider à tracer la carte de la malaria et ses formes. J'ose espérer que l'on ne trouvera pas tout à fait inutile ce travail que j'ai pris plaisir à exécuter dans le but de prendre part à l'œuvre éminente que les congrès de ce genre ont entreprit, et de correspondre ainsi à la confiance que m'a accordée le gouvernement de l'État de Véra-Cruz (Mexique) en m'honorant de sa représentation au 1er Congrès Médical Pan-Américain, siégeant à Washington en 1893.

ARE THE CASES OF FEVER WITH EXCESSIVE SWEATING OBSERVED AND DESCRIBED OF LATE A MANIFESTATION OF INFLUENZAL POISON, AND ARE THEY IDENTICAL WITH THE "SWEATING SICKNESS," THE "PICARDY SWEAT," CARDIAC SICKNESS, AND MILIARY FEVER, AS DESCRIBED BY ANCIENT WRITERS AND HECKER IN HIS "EPIDEMICS OF THE MIDDLE AGES?"

By ROLAND G. CURTIN, M. D., and EDWARD W. WATSON, M. D.

The question of the identity with influenza of the cases of excessive sweating seen frequently in the last four years is scarcely open to dispute, since in the cases observed either the initial symptoms were those of influenza or the sweating was evidently a sequel to a well-marked influenzal attack. All influenza, as a rule, was marked by relaxation of the skin, after the initial period and the subsidence of the earlier symptoms; and this often continued in a mild form (sweating on slight exertion, sweating when in bed and on slight exposure to cold) for days and weeks. But the cases directly under consideration were marked by such excessive relaxation, and so entirely different from any previously observed in any other disease (except possibly in rare cases of convalescence from malarial and rheumatic disease, from which they differed in the odor of the perspiration), that they could not but strike the observer as unique. (We might add that, since the epidemic, sweating in

phthisis and in other diseases, has been much aggravated.) This may be explained by a combination of the general catarrhal conditions, a hydrorrhœa of the skin, or what might be termed, for the want of a better name, a cutaneous catarrh of the sudoriforous glands.

In the early epidemic of 1889-'90, a number of cases were observed in which there was this tendency to a remarkable degree, continuing for weeks without emaciation or exhaustion, or induced anæmia. These cases often perspired to such an extent that in cold rooms they seemed enveloped in steam, and at times as they were observed in bed the ear which was uppermost and the corresponding hollow of the cheek were full of water. At times the sweat moistened the mattress, and from below upward the moisture would outline the form of the patient on the coverlid.

In one case this condition lasted one week, in another four weeks, in another three months, in others five months, and in two six months, and one case affected a year ago, even now on slight exposure to cold continues to sweat profusely.

Many practitioners alluded in conversation, or in periodical medical literature, to similar cases. One writer in the South reporting an epidemic in his locality, of what he termed a "sweating fever," and in the communication referred to asked information as to its nature. From the description given it was evidently something more than ordinary epidemic influenza, or simple catarrhal fever as usually observed, but resembled closely some of the cases seen by the writers in the past four years. Our cases generally began with an attack of influenza or had some of the complications and sequallæ of influenza, viz, the pulmonary or cardiac symptoms (angina pectoris, pericarditis, and heart failure), or affections of the peripheral nerves of one or both arms, rheumatoid pains, meningitis, neuritic diarrhea and other catarrhal affections, and insomnia. With this profuse sweating the temperature night and day was generally near the normal, often either merely a little above or below.

It is easy to understand from what we have seen of influenza, that in different periods of an epidemic, different structures may be predominantly affected, viz, an epidemic of influenza in which cardiac symptoms predominate might under depletion and the unwise use of depressants come to resemble the so-called "cardiac disease" of ancient times; or where the vasomotor nerves especially suffered under like improper management, overheating, excessive covering, and the abuse of diaphoretics, a genuine "sweating sickness" might be produced; or the extreme sweating producing copious miliary eruption, we might with justice call it the miliary "fever." In fact the recent epidemic has by turns exhibited the characteristics of the various disorders described and preserved to us in the writings of several ancient observers, and it may prove of some value to contrast them with those extant observations.

The following shows what symptoms and conditions were common to all the above-mentioned diseases. They were all: Epidemic; sudden in onset; commenced with chilliness or rigor; accompanied by more or less intense headache and fever; the strong were attacked rather than the weak, the comfortable classes rather than the extreme poor; all were attended by sweat of unpleasant or fetid odor; occasional varied hemorrhages in all; vomiting or purging at times in all; meningeal and other nervous symptoms; nervous prostration and prickling pains; sudden paralysis, heart excitation, heart failure, pericarditis; rheumatic pains—gouty symptoms; all were infectious or contagious; all had catarrhal symptoms, and sudamina or other eruptions; milliaria rubra or milliaria papulosa; in all the atmospheric conditions favoring spread of the disorder were fogs and humid atmosphere; stimulants were in all beneficial; excessive secretion of urine and sweating came together; all were alike sensitive to colds and drafts; checked perspiration caused diarrhœa; relapses were frequent.

Mortality light in acute influenza, heavy in all others (this can be somewhat accounted for by modern therapeutics and hygiene), and much in this respect depends upon the peculiarity of the epidemic.

The sequallæ in all very similar; the general constitution was shaken—dropsy, consumption, heart failure, low fevers or forms of fever followed, and insanity and suicide were frequent.

A brief study of the foregoing will show how very analogous, to say the least, were all these diseases. Certain marked peculiarities not found in other diseases generally were common to all. The most marked is sweating, so that from the descriptions which have come down to us one could see little reason why the name of "sweating sickness" might not have been applied to many of them (at least in some of their extreme and varied manifestations). The group of nervous symptoms common to all is very striking and peculiar. These diseases seem to have been all recognized as contagious or infectious, and occurred as epidemics and often seemed to supplant (follow or succeed) one another rapidly. The rheumatoid and gouty symptoms, the heart complications, while in some more prominent, existed in all. The description of the cardiac disease might be applied line for line to some of the severer cardiac influenzal cases recently met with, and at times associated with these was associated profuse sweating, as profuse and overwhelming as that described in the "sweating sickness" of antiquity, lacking only its extreme malignancy.

The sequallæ also seem to closely resemble each other in all, and the atmospheric conditions—fogs and rain, and a warm moist wet state of weather seem to have in all been exciting causes.

We are almost forced to the conclusion that if not identically the same, these diseases belong to the same group or family, and are intimately correlated. They seem to have preceded, replaced, or followed each other in close succession through quite an extended period or prevailed in different countries almost simultaneously, at times seeming to be conveyed by contagion or infection. Of their real origin we have no more accurate knowledge to-day than our forefathers had, but it seems a reasonable and probable deduction that there exists almost constantly in the world a form of influenza (generally transient and mild) known to us as the cold we take under various atmospheric causes, which under vicious atmospheric conditions and climatic variations is capable of developing in one or another direction—and so into the various forms which we have been considering. If not the same in origin, when once their microbic cause is really isolated and identified beyond a doubt, it will in all probability be found to be but varying forms and outgrowths of the same germ, or that varying germs exist (as in other cases is already recognized) of similar influences, causing these different diseases which may be considered as but malignant varieties of that influenza with which the world is at present so unpleasantly familiar.

A CONTRIBUTION TO THE CLINICAL STUDY OF PROLONGED REMITTENT FEVER.

By DAVID LOBO, M. D., Caracas, Venezuela.

It is my purpose to describe, under this heading, a certain form of malarial infection which, I believe, has not sufficiently attracted the attention of standard writers on tropical diseases. This description, the material for which I will borrow from clinical observation exclusively, refers to all the different conditions of individual life, and is intended to import my personal views in regard to the malady, as it is wont to occur in the capital city of Venezuela.

ETIOLOGY.

So far as my own experience shows, conjointly with the information obtained from prominent members of the profession, the normal type of malarial fever, the intermittent form, is rarely met with in the city of Caracas. Its presence, when noticed,

can nearly always be traced to an original infection at some of the genuine sources of the disease, either on the banks of the Orinoco River and Lake Valencia, or over the plains of Guarico.

I have seen many a patient with pale yellowish skin, enlarged liver and gigantic spleen, that have entirely recovered at Caracas, under the combined action of arsenic, small doses of quinine, and proper diet; while, on the other hand, a thorough and close examination will seldom, if ever, succeed in detecting any marked congestion of the above-mentioned organs, in the majority of cases primarily developing within the bounds of the city. Acute catarrhal hyperæmia of the liver is apt to occur occasionally, but then it must be regarded as a special complication, requiring immediate attention on account of its injurious influence on the course of the fever.

In such cases, in fact, hepatic congestion is merely a complication, not a necessary sequela, not even a general sign of malarial poisoning, for the gland is affected in the same manner with other viscera of the body, and by the same powerful cause under which the whole system is laboring. So this special condition of the liver and spleen, which, as a rule, is always present in regular malaria, will never be found as a characteristic manifestation in any one case of the fever now under consideration, be it of short or protracted duration, mild or grave; nor is there, besides, any constant similarity between the ordinary general symptoms corresponding to the two varieties of disease.

The wide clinical difference existing between them which, in numerous instances, is strikingly confirmed by the inefficiency of the specific treatment appears to be indicative either of some peculiar systematic condition of the patient or of certain uncommon changes in the constituents and quality of the pathogenic germ. That we can safely disregard the former cause and acknowledge the probable existence of the latter is proved, however, by the facts that true intermittent fever is unfrequent at Caracas, and that persons from this city easily acquire it in other regions of the country.

The aspect and extraordinary course of the Caracas fever may be due to corresponding variations in the power and quality of Laveran's corpuscles, to overpoisoning of the blood, or perhaps to some distinct element operating simultaneously with the paludal germ. For as there are recognized alterations in the number, morphology, and mode of development of these minute organisms seemingly connected with the tertian, quartan, and irregular types, so there is no reason whatever why similar conditions should not be admitted as productive of the fever now to be described.

The subject involves so many important questions that I do not hesitate in commending it to the attention of my distinguished colleagues here assembled and of the profession in general.

I will lay aside the mild forms of remittent fever, the pernicious and other manifestations where one or more of the ordinary stages are always present, and consider, in particular, that variety to which the name of prolonged remittent fever may be properly assigned. This, as the term implies, is distinguished from all others by its long duration, extending through a period of from three weeks to three months, and even more occasionally, as it will be shown hereafter.

GENERAL SYMPTOMS.

Temperature.—In no other disease have I ever noticed a more startling course of the bodily heat. Variations in temperature actually take place, but they do not respond to any fixed law of recurrence. Remission occurs either in the early morning, which is frequently the case, or in the evening; sometimes it does not occur at all during a full lapse of twenty-four hours. In many instances the highest termic point is attained at noon or sometime after it, and then the heat gradually drops to an almost normal figure at sunset.

The temperature, again, may remain quite low, not exceeding 37·5 or 38° C., during two, three, or more successive days, thus misleading the practitioner's prudence into

untimely avowals; an abrupt rise, however, supervenes, the thermometer promptly marks 40 or 41° C., and the fever resumes its previous course, regardless of treatment. In the case of a patient fifty-two years old, whom I had under my care sometime ago, a complete intermission of the fever suddenly took place two weeks after the outset, and lasted six days without interruption; yet early on the seventh, I found to my surprise, that the temperature had run up to 39·6° C., and that, together with the recurrence of this symptom, several other grave phenomena had made their appearance. The man subsequently sank into coma, and died in thirty-six hours, notwithstanding the vigorous exhibition of drugs to which he was submitted.

It may be stated, summarily, that temperature in long remittent fever generally ranges from 38·5 to 40·5° C., and follows no regular course, although the morning remission is observed in a great number of cases. It may fall to a normal figure, and even considerably lower, and the decrease may either last a few minutes, or be maintained through a number of hours or even days. In the latter case, the disease assumes a deceitful air, against which the physician can not be too earnestly cautioned.

Chills and sweating are likely to occur, but never at definite stages of the fever. Every rise of temperature may or may not be preceded by one or many chills, the duration of which is commonly very short. This unpleasant symptom may be wholly absent. Defervescence is sometimes followed by perspiration, other than that induced by antithermic remedies. No rule whatever can be pronounced in regard to the two preceding phenomena.

SPECIAL SYMPTOMS.

Circulation.—As it is the case in all other fevers, the pulse rate varies in accordance with the quantity of heat developed. The contractile power of the heart naturally becomes impaired as the disease progresses, but the general rule will hold true so long as no complication will intervene. Any divergency arising between pulse and temperature should be looked to and carefully treated, as it is the warning of some serious disturbance of the sympathetic functions.

Respiration.—The same principles set forth in respect to circulation hold good for the respiratory organs. Pulmonary complications, such as paludal pseudo-pneumonia, pleurisy, etc., will be examined hereafter, along with other serious conditions that are apt to endanger the patient's welfare.

Digestion.—The appetite is always entirely lost, or at least very poor. Tongue is generally smooth, clean, and moist. Bowels act well; there are one or two passages every day, and the fæces have their normal appearance and color. Diarrhea of a simple character is sometimes present, at others, constipation may be observed. Intense abdominal pain, meteorism, profuse diarrhea, and obstinate constipation, especially if accompanied by frequent vomiting, reveal the existence of some pathological process located in the digestive tract. Vomiting is apt to occur, but never to a distressing extent. Emesis commonly takes place after the indigestion of food, and is partly ascribable to the marked reluctance with which patients take their nourishment.

Urine.—No changes worth mentioning are ever offered by urine in genuine cases of this pyrexia. The excretion of albumen or blood, except in the so-called "*hæmaturic fever,*" is denied by most writers on malarial diseases, and my experience entirely agrees with theirs. The existence of either substance in urine must be imputed to hyperæmia of the kidneys, not to dyscrasy. As to quantity and color, slight variations may occur, which, being common to all fevers, do not call for description in this place.

Liver and spleen.—In regard to these organs, which seldom escape the action of the malarial poison, the reader's attention is referred to the preliminary considerations contained in this paper. But I desire to lay particular stress on the fact that the spleen is seldom, if ever, enlarged or congested in long remittent fever. My own observation fully justifies the assertion, at least from a clinical point of view.

Nervous system.—Headache is not a common symptom, neither is vertigo or giddiness, but insomnia often distresses the patient. Delirium is never present. There is no impairment of sensibility and motility; cerebral and spinal functions do not, in act, exhibit any deviations in uncomplicated cases of remittent fever.

COURSE DURATION.

The fever frequently runs its entire course free from any important derangement of the deep-seated organs. A fatal issue, in such cases, can hardly be attributed to other cause than deteriorating from continued overheating of the body. Occasionally, however, serious disturbances make their appearance, which superadd their destructive action to that of fever, and either jeopardize the patient's life or actually put an end to it. In the majority of cases such complications spring forth unexpectedly, baffling the physician's views, and changing altogether the previous character and prognosis of the disease. They may supervene at any moment, and their gravity depends entirely on the importance of the organ attacked. The condition of the patient should be constantly examined, in order to recognize the slightest signs of mischief and trace them to their real cause and origin.

The temperature may suddenly fall, not to rise again, or it may gradually diminish until the normal figure is reached; both modes are observed, but the latter is decidedly the more common.

As regards duration, the following table will show that remittent fever is not governed by any cyclic law, as typhoid or yellow fever commonly are. Not one among a large number of cases that have come under my observation in city practice has run its full course in less than fifteen or twenty days. This I consider to be the briefest period ever observed, as evidenced by the 21 clinical cases in the table. As to the extreme limit of duration, it may be drawn within an ample space of time, comprised between twenty days and three months; very few cases are protracted beyond this term. In that of a young female, mentioned in the table, the fever lasted ninety-five days and terminated in death, undoubtedly from exhaustion. By comparing the figures, the average duration of the fever can be estimated at thirty-five days.

It is obvious, from the preceding description, that the whole clinical history of the disease may be summed up and condensed into two main and prominent facts, viz, an irregular, fluctuating temperature, and a long, weary career not equaled by that of the most protracted typhoid fever. Day after day close observation will fail to detect any abnormal condition of the viscera. We search in vain; no organic lesion underlies the trouble. And whether the patient die or recover, we must ultimately conclude that there existed no other apparent phenomenon than an undaunted conflagration of the tissues.

Sex.	Age.	Duration.	Termination.	Cause of death.	Remarks.
		Days.			
Female	19	70–75	Recovered		Intense ovarian pain during convalescence.
Do	12	43–45	do		
Male	9	20–23	do		
Do	4	46–48	do		Diarrhea lasting two weeks, accompanied by slight hepatic trouble.
Female	1½	28–30	do		Cerebral congestion, coma during three days.
Male	23	65	Death	Exhaustion	Acute liver congestion, diarrhea, rectitis, after the first month.
Do	9	30	Recovered		Profound debility from the outset.
Female	12	20–23	do		
Male	42	23–25	do		Slight congestion of the liver.
Female	22	23	do		
Do	18	25–28	do		
Male	55	20	Death	Brain lesion	Pseudo-pneumonia, right side. Six days' truce, simulating recovery. Sudden drawback; cerebral congestion and coma.

Sex.	Age.	Duration.	Termination.	Cause of death.	Remarks.
		Days.			
Male	46	18–20	Recovered		
Female	28	30	do		Intestinal hemorrhage twice. High temperature.
Do	25	30–35	do		Twenty days under treatment, after which fever gradually abated without medicine.
Male	14	20–22	do		
Female	12	95	Death	Exhaustion	Vomiting, diarrhea, absolute anorexia.
Male	9	25–28	Recovered		Diarrhea, rectitis. Profound debility.
Do	28	16–20	do		
Do	20	52	Death	Peritonitis	Intercurrence of measles. Peritonitis on the fiftieth day.
Female	32	20–22	Recovered		Intense chills. High temperature.

Diagnosis.—There is no considerable difficulty in discriminating prolonged remittent fever from other pyrexias. The difference between this and the other malarial forms lies mainly in its uncommon course, its lack of regularity as regards temperature, the absence of marked stages, and of splenic or hepatic troubles, and the unconquerable resistance it opposes to the action of quinine.

No confusion between it and typhoid fever is possible, as the latter is subjected to a definite thermic cycle, is invariably accompanied by intestinal lesions, and presents certain eruptions which, sudamina excepted, are never found in the former. Typhoid, besides, is extremely rare at Caracas.

With the so called typho-malaria the differential diagnosis can be easily established, if we bear in mind that in regular remittent no typhoid symptoms are ever present, whether abdominal, nervous, or other.

Yellow fever is apt to be, and often is, mistaken for bilious remittent, a disease quite distinct from the one under consideration, but yellow fever runs a rapid career—six to ten days—and exhibits among its symptoms vomiting of black matter and albuminuria, neither of which is ever observed in remittent.

As for pernicious fevers, their duration is generally so brief and their aspect so characteristic, that no particular line of distinction need be drawn to separate them from their congener.

Prognosis.—It may be asserted, as a general rule, that unless the course of the disease be interfered with by complicating or intercurring processes, a fatal issue is seldom to be feared. When death does occur, it is reasonable to ascribe it either to irremediable debility and anæmia, or to degenerative changes wrought in the most vital tissues by the continued hyperthermia to which the system had been subjected. Hence, very high temperature, extreme weakness, frequent vomiting, copious sweating, and diarrhea impart in every case a serious character to the disease, as they denote bad conditions for repair and actually hinder the proper assimilation of food and drugs.

Prognosis is utterly different when we have to deal with organic complications. These are all dangerous occurrences, but not to the same extent. Cerebral disorders rank first, as they bring on a fatal termination almost without exception. Pulmonary congestion is more tractable; its curability greatly depends on the intensity and magnitude of the process. Acute entero-colitis with watery discharges, ulceration of the bowels, peritonitis, I consider almost as serious as cerebral determinations. Congestion of the liver generally yields to proper treatment. Patients previously laboring under chronic conditions, such as tuberculosis, intestinal catarrh, rheumatism, infarction of the liver, etc., are especially liable to complications and the consequences thereof.

Accidental diseases are seldom met with. I have seen the grafting of measles six days after the start of the fever; the exanthema reached full development and presented all its stages. A fatal result took place later on, but it was entirely due to peritonitis. (*See* table.)

Complete recovery should not be declared before absolute certainty has been acquired that the symptoms shall not recur, and that all danger of complication is over. I think prudent reserve during eight or ten days will cover all chances of error.

Complications.—The respiratory organs are those most frequently attacked by the malarial poison during the course of long remittent fever. The lungs become congested, and parenchymatous inflammation is kindled, which, being widely different from ordinary lobar phlegmasies, have been denominated spurious pneumonia. I believe the term "pseudo-pneumonia" is preferable. The process may be accompanied by pleurisy or bronchitis, but the former is unquestionably more apt to occur.

Pseudopneumonia does not exhibit the ordinary stages ruling genuine pneumonia, nor do its signs and symptoms accord with those of the latter disorder. It often happens that auscultation furnishes no evidence of crepitant rales, a fact that may be possibly accounted for by the rapidity with which the fluxion takes place. Tube respiration is generally heard from the very onset of the affection, denoting, as already mentioned, the short time required for the production of hepatization.

The souffle coincides with expiration rather more frequently than with inspiration. Pain is absent in the majority of cases, and when it exists there is but little doubt that the pleura has been involved. Sputa are viscid, scanty, and bloody; rusty expectoration properly is seldom observed. A whole lobe, or only a restricted portion of a lobe, may be affected, but the disease is in most cases confined to one side. The seat is also subject to change. In the space of a few days, or even a few hours, the process may disappear from one lobe to rush upon another, or may entirely release one lung to invade its fellow. Gangrene and suppuration I have never seen. Pseudopneumonia runs its career in six or eight days, and often leads to a fatal termination.

Among nervous complications none is so terrible as cerebral congestion. There are no premonitory signs ushering it, nor any special feature of the fever capable of giving the practitioner a timely warning. The posion abruptly determines to the brain, there to exert its dire action.

The cerebral trouble may assume either a convulsive or a comatose form, the latter being decidedly more common. In this complete relaxation of the body and unconsciousness are prominent symptoms from the beginning. Now and then the patient may be aroused, and even succeeds in answering a few questions, but he gradually resumes his slumber when allowed to rest, until deep coma is settled. Retention of excreta, insensibility of pupils to light, Cheyne-Stokes respiration, and other symptons of ordinary comatose conditions are all present in this most intractable complication.

As to the convulsive form, I am inclined to believe that its production must be mainly ascribed to meningeal congestion. Whether this view is correct or not, however, I can not decide, as only one case of the affection has fallen under my observation. True encephalitis, localized lesions of the brain, and spinal derangements I have never found as complications of remittent fever. The issue is fatal in nine cases out of ten.

Active hepatic congestion is also a possible occurrence, although not necessarily connected with this fever, as previously stated. The condition sometimes gives rise to jaundice, pain, and frequent vomiting, but diarrhea is more likely to ensue as a consequence of the functional trouble of the gland. Abcess must be very rare, since I have never noticed its existence. There is no doubt, however, that it may rise from dysentery or any other infectious condition of the bowel, complicating the disease. Congestion of the liver speedily recedes under proper treatment.

Acute enterocolitis, dysentery, and choleriform diarrhea may be originated by the paludal germ at some moment or other during the normal progress of the fever. The two last mentioned I consider to be the most intractable intestinal complications. None of them assumes a periodic or paroxysmal form, as they are wont to do

in ordinary pernicious fever, a distinction that I have already noted in reference to diagnosis. Hemorrhage and acute peritonitis are apt to occur as secondary phenomena subsequently to ulceration of the alimentary duct. Symtoms of peritoneal irritation may be noticed, which, not being due to perforations, must be attributed either to direct agency of the poison or to extension of the inflammatory process beyond the mucous membrane. I have no record, however, of peritonitis having interfered with the fever without a previous serious lesion of the intestine.

The kidneys generally undergo no injury at all. In normal remittent fever urine is never albuminous. Hematuria appertains to pernicious malaria, a special variety of which has been described under the name of hematuric malarial fever. None of my patients ever passed bloody urine.

Treatment.—I have already mentioned the fact that this variety of remittent fever does not respond to the action of quinine so speedily as other forms of malaria generally do. There are cases, not few in number, where the exhibition of the drug is absolutely useless, as it will neither abridge the duration of the disease nor modify its character. I have prescribed 2, 3, and even more grams of quinine per diem without deriving any benefit whatever from so liberal a therapeutic measure. Far from this, irritation of the stomach, vomiting, diarrhea, depression of the heart, and collapse are apt to follow a long-continued administration of the remedy or the ingestion of considerable doses at a time. I am quite confident that 1½ grams, divided into three equal portions, to be given at separate intervals, will answer the purpose without producing any unpleasant effect. But if there be no evidence of improvement after a period of ten or fifteen days the quantity should be restricted to a single half-gram dose in the morning, thus allowing room for the administration of other agents. The view assumed by some practitioners that full doses of quinine will prevent complications is merely hypothetic, as no clinical facts can be produced to its support. Quinine may be given subcutaneously where obstinate vomiting is present or in cases of extreme gravity.

Aconite, arsenic, and carbolic acid may be resorted to whenever there is a tendency to protraction. Aconite is rather a sedative, operating indirectly upon temperature, than an agent capable of subduing the fever. I rely very little upon it. Arsenic seems to be a good remedy, but it has proved entirely inefficient in a large number of cases. The same may be stated of carbolic acid, whether alone or combined with the tincture of iodine, according to Bartholow's formula.

Warburg's fever tincture, a tonic febrifuge containing quinine, has been of great service in some of my cases, yet in others it has proved valueless.

Salicylate of sodium, antipirine, antifebrine, and similar agents are employed to diminish temperature, and thus provide a favorable opportunity for the administration of quinine. Their effects should be carefully watched, as hypothermia, depression, and collapse may follow their use.

Tonics should be ordered *larga manu*. Nux vomica, cinchona, serpentaria are the most reliable.

Chlorate, iodide, and bromide of potassium have been known to act beneficially in some very chronic cases.

Cool baths or lotions are an innocent and efficient means of lowering the temperature. They may be given every two or three hours, or as often as required. They should not be spared, inasmuch as they are a source of pleasure for the overheated organism of the patient.

A proper diet should be established from the first. Beef tea, light broth, milk, arrowroot, sage, etc., must be regularly given, along with good wine and small doses of brandy conveniently diluted. If there exist nausea or vomiting, ice may be prescribed, together with other antiemetics.

Complications call for a special treatment, entirely dependent on the nature of each case.

A CASE OF ACROMEGALY IN A GIANTESS.

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About the middle of February, 1893, "Lady Aama," a French giantess, was brought to this city to be exhibited in a dime museum. A week or so later she was taken ill, and on the 27th of the month her death was reported.

Negotiations were opened with the party under whose escort she was traveling, and her body was secured for the museum of the State University at Iowa City, and an opportunity was thus afforded me for examining what proved to be a most interesting anomaly.

Owing, however, to the unavoidable pressure of other work at the time of the autopsy and previous to the use of the body in the dissecting room I was unable to work out many of the details at all as thoroughly as I should have liked or as the importance of the subject deserved, and my only excuse for presenting such an imperfect sketch as follows is the great interest and unusual nature of the case. For the careful measurements of the skeleton and the photographs I am indebted to the kindness of Dr. J. W. Harriman and Mr. Frank Carroll.

"Lady Aama" had been reported and advertised to be "over 8 feet" in height but this was of course recognized as merely the "regulation stature" of all giants thought worthy of an introduction to the public and it was no surprise to find that her height, or more properly, length when carefully measured five days after death was exactly 6 feet 7¾ inches, though possibly it might have exceeded this slightly during life when the arch of the instep would be better supported and the intervertebral disks unshrunken. The measurements were taken between two uprights standing perpendicular to the table on which the body lay and pressed against the vertex of the head and heel and ball of the foot respectively.

Her baptismal name was Emma Alline Batallaid and her birthplace on the slopes of the Jura in France, her age being variously stated, by her sisters, at 19 and 17 years, the latter appearing most probable on later examination, as scarcely a third of the epiphyses in her skeleton were united with their apophyses, although this may have been a part of the general imperfect development of all of her tissues. The "oldest" epiphysis united was that at the lower end at the tibia, eighteenth year (Quain).

The cause of her death was given as "quick consumption," which had lasted for only six months or so, but on more careful inquiry it was found that she had been failing gradually in strength for some four or five years past and had died quite suddenly—she was exhibited within three days of her death—in what appeared to have been an attack of la grippe or of acute bronchitis; death occurring from syncope after a severe fit of coughing.

She suffered very little pain during her illness, and the muscular weakness was so extreme that for weeks before her death she was obliged to support herself, when standing, by holding on to an upright rod fixed in the floor. In fact, her death appeared mainly due to a general state of collapse hastened by an acute coryza. She was the fifteenth child of a poor laborer, all the others being of normal height (one sister accompanying her and shown in Fig. 1). The latter declared that she was still increasing in height up to the time of her death. Her intelligence was decidedly poor, but in no way abnormal.

The body was extremely emaciated and the first thing which arrested the attention was the apparently small size of the chest and trunk, as a whole, compared with the greatly elongated extremities. This, of course, was merely in accordance with what I believe is the rule in such cases, viz, that the increase in height in giants

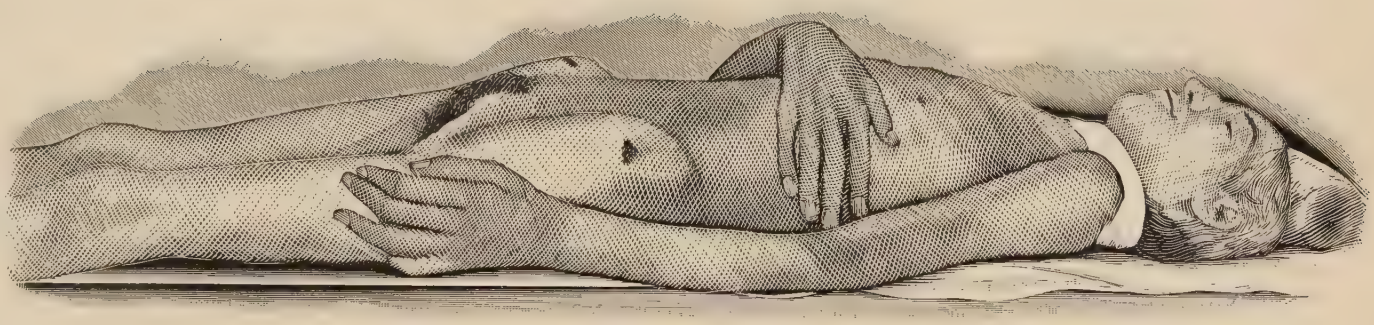

Fig. I.—PHOTOGRAPH TAKEN AFTER DEATH, SHOWING HANDS, ARM, AND FEATURES.

and the decrease in dwarfs is principally in the limbs, the body being comparatively near the normal standard in both cases.

This impression was found to be correct by the measurements, which revealed that the length of the lower extremity from the top of the great trochanter to the lower border of the os calcis was 47 inches, or nearly 60 per cent of the total height, while the mid point of the latter usually lies about an inch below this level—upper border of symphysis (Quain). According to Blanc's canon,* as followed by the ancient Egyptian artists, the length of the lower limb from this point should be ten-nineteenths of the entire height, which, in Aama's case would be 41⅞ inches, or 5½ inches less than the actual measurement. The same was found true at the upper extremity (acromion to tip of middle finger), which, by the same canon, should have been eight-nineteenths of the total stature, 33½ inches, but actually measured 37 inches.

The same relation is found to be carried out in the measurements of the bones of the chest, the sternum measuring 8¼ inches, or barely a quarter of an inch longer than that of the average adult male (Duval), and the clavicle 7 inches, or only 1 inch above the same standard.

The extent to which the excessive height consisted of length of limb can be seen by comparing Aama's lower limb with that of the average of her race, which would be ten-nineteenths of 5 feet 5·2 inches (Quatrefages) = 31·3 inches, a difference of 12·6 inches, or nearly three-fourths of the total excess of height.

The next noticeable feature was the disproportionate size and peculiar shape of her hands, feet and lower jaw, which is fairly shown in Figs. I and II.

Measurements were again found to confirm this impression, the hand instead of being, according to the artistic canon, one-tenth of the total height (7·9 inches) was actually 11·25 inches in length or nearly one-seventh of the height, and of a peculiarly "spade-like" shape with long square-tipped fingers of uniform breadth throughout their length. The foot instead of three nineteenths of the height (12·6 inches) measured 13·75 inches, while not only the jaw but also the nasal bones, as shown in Fig. III, were decidedly enlarged. The lower jaw measured 6¼ inches from angle to symphysis as against the 3¾ inches which is the norm for male adults. The skull proper, on the other hand, was found to be barely above the average size, measuring 21⅛ inches in circumference as compared with the norm (female) of 20 inches.

There was absolutely nothing in a view of the trunk above the pubes to indicate the sex, the mammary glands being almost completely absent, and the circumference of the chest being only 2 inches less than that of the hips (39 inches).

The nipples were flat and small, and upon dissection a mere trace of gland tissue and of a suspensory ligament could be made out. The integument of the body was thickish and earthy-looking, but not otherwise abnormal, and the hair of the scalp was thin and sparse, but of about normal length.

AUTOPSY.

I was not able to be present at the autopsy and it was performed by my prosector, unfortunately without special reference to the possibility of acromegaly.

Emaciation extreme. Heart slightly above normal size. Left ventricle enlarged and dilated valves and pericardium normal.

Lungs.—Normal except in size, which appeared below the average. Light in color and completely collapsed. No pleural adhesions.

Spleen.—Greatly enlarged. Weight 2 pounds. Pulp grayish. Capsule thin and surface lobulated.

Kidneys.—Normal, capsule nonadherent.

Liver.—Slightly enlarged but otherwise healthy. Supra-venals enlarged.

Thyroid gland.—Normal in size and appearance. The brain was pale and sodden-looking, but, owing probably to the fact of its being impossible to make an autopsy

* Artistic Anatomy, Duval.

until nearly a week after death, in such degenerated condition that it was difficult to remove it entire. This was especially marked at the tip of the left temporo-sphenoidal lobe, which was removed as a putty-like mass of débris. From the same cause the pituitary body, which was greatly enlarged, was torn across in removing and its form and outlines completely destroyed.

Its dimensions (reported as "about the size of the last joint of the thumb"), however, can be judged by those of the fossa—well shown in Fig. III—which measured 1¼ inches in its antero-posterior and 1½ inches in its transverse diameters.

The weight of the brain (after hardening in alcohol to permit of its handling) was 36 ounces or 8 ounces, below the average (female).

The lateral ventricles appeared somewhat dilated, the tip of the anterior horn being enlarged and rounded and the cavity of the third extended down into the infundibulum There were no hemorrhagic patches and the membranes were healthy. The convolutions, fissures, and general proportions were normal, except for a peculiar thickening and compression backward of the temporo-sphenoidal lobes causing the anterior third of the fissure of Sylvius to run almost vertically and the uncinate gyrus to project internally.

The most striking abnormality was found in the generative organs.

The mons veneris and labia majora were flat and poorly developed. The clitoris was nearly half an inch in diameter and extremely prominent and with the large clitoridal folds, 1½ inches in length, presented no very fanciful resemblance to a small and imperfectly developed penis. This probably was the cause of the reports circulated during "Aama's" lifetime that she was an hermaphrodite. The vagina was small and straight, barely capable of admitting the fore finger.

The uterus was 1¼ inches in length and two-thirds inch broad—about the size and shape of the last joint of the little finger and weighed 2 drachms.

The Fallopian tubes were barely recognizable and their abdominal extremities had only three or four rudimentary fimbriæ (none attached to the ovary). The ovaries were small granular looking masses about the size of the finger nail, adhering to the posterior surface of the broad ligament.

THE SKELETON.

After the removal of the softer tissues the bones were macerated and cleaned with the hope of being able to mount them for the Museum, but such was their spongy, crumbling condition that it seemed doubtful whether they were firm enough to hold the wires and support their own weight. The whole osseous system appeared to be in a condition of osteo-porosis, a touch would dislodge the teeth from their sockets, the ribs and slighter bones would snap across at the slightest strain and the epiphyseal plates upon the bodies of the vertebrae could be lifted off with the finger. In fact it literally appeared as if there was no more actual osseous material in this gigantic skeleton than would be required to make a sound, firm, bony framework of the average size. The bones, though much larger, were very little heavier than normal, the radius, scapula, and fibula, for instance, being found to exceed the average of healthy bones in weight only 10 per cent.

The skull (Figs. III and IV).

	Inches.
Circumference at level of glabella	21⅓
Distance between ext. orbital processes	5⅓
Superciliary ridge to point of symphysis	6¾
Angle of inferior maxilla to symphysis	6¼
Length of nasal bone	1¼
Breadth of nasal bone	¾
Glabella to occipital point	7¼
Breadth index	74
Height index	76

FIG. II.—LATERAL VIEW OF SKULL.
(Nasal bones and lachrymal groove outlined in crayon.)

FIG. III.—VIEW OF INTERIOR OF CRANIUM, SHOWING ENLARGED PITUITARY FOSSA.

A most striking illustration of the highly rarified, not to say cavernous condition of the bones, is seen in the condition of the frontal sinuses (Fig. III), which are huge cavities, 2 inches from side to side on the right side, and 2⅜ inches on the left, three-fourths inch from before backward, and 1½ inches in depth, the bony tissue being expanded to a mere shell of the thickness of writing paper. The same condition was found in the maxillary antrum, which was actually cribriform in the tuberosity, while the squamous plate of the temporal was so extremely thin that the groove for the middle meningeal artery actually causes a perforation half an inch long on the right side. The zygoma is also reduced, at one point, to the thickness of pasteboard.

Except the great size of the pituitary fossa, the only noticeable alteration of the cranial interior is a peculiarly shortening and thickening (antero-posteriorly) of the petrous bars (which can be seen in the photograph) accompanied by an internal auditory meatus, nearly double the normal size, and placed well down upon their posterior surface. This has almost the appearance of having been caused by the pressure of an enlarged pituitary body during embryonic life, preventing their growth inward and forward, and causing them to enlarge laterally. As if this had actually been the case, the caroted canals are considerably larger than normal (three-eighths of an inch in antero-posterior diameter), while the jugular foramina are overlapped by this bulging to such an extent that their diameter, as seen from the interior of the cranium, is reduced on the right side to less than two-thirds of what it is on the under surface of the skull, and on the left to less than one-third. On the right side, a spur of bone projects completely across the aperture and by the left side, it is an elongated irregular slit.

The large size of the nasal bones, outlined in crayon, and the width of the upper end of the lachrymal groove are seen in Fig. III. The lachrymal canal is proportionately dilated, measuring, at the level of the floor of the orbit, no less than three-eighths of an inch in transverse and one-fourth of an inch in antero-posterior diameters. An ordinary female silver (No. 18, French) catheter can be readily passed down it into the nose.

The crumbling condition of both upper and lower alveolar processes and the looseness of the teeth can also be seen (Fig. II), many of the fangs being exposed. All the upper incisors, canine, bicuspids, and first molar on the left side have disappeared, and the alveolus is atrophied, while the remaining teeth are either loose in their sockets or have large cavities in their crowns. An upper plate was worn during life.

Pelvis and trunk.

Pelvis:

	Inches.
Circumference around crest	38
Transverse from ant. sup. spine to same	15
Superior strait	6½
Inferior strait	6
Depth	7
Transverse diameter	6½
Antero-post diameter	7
Sym. of pubis to tuberosity of ischium	6½
Crest of ilium to tuberosity of ischium	11
Ant. sup. spine to post. sup. spine	8
Ant. sup. spine to post. inf. spine	9½
Crest of ilium to sacro-sciatic notch	7
Length of sacrum and coccyx (internal)	9⅓
Length of sacrum and coccyx (external)	10⅓
Long. diam. of sacro-sciatic foramen	2¾
Diameter of acetabulum	2⅛, 2½
Depth of acetabulum	1⅜, 1½
Depth of pubic symphises	2⅜

	Inches.
Lumbar vertebra (4th):	
Tip to tip of transverse processes	5¾
Body	2¼, 2¾
Spine—atlas to end of coccyx following curves (ant.)	42
Sternum, length	8½
Inferior maxilla (straight line from symphyses to condyle)	6¼
Clavicle, length	7
Scapula (inf. angle to tip of acromion)	10¾

The sternum presented a central round perforation one-third of an inch in diameter in the third piece of the gladiolus and the fourth price was cleft and broad at its extremity.

The acromial epiphysis was in two pieces.

Upper extremity:

	Inches.
Whole arm and hand	37
Humerus	15½
Olecranon to tip of second finger	23
Ulna	11¾
Radius	11⅛
Middle metacarpal and finger	9⅝
Metacarpal (middle)	3⅞
First phalanx (middle)	2⅝
Lower extremity:	
Head of femur to os calcis	47½
Femur (head to int. condyle)	23¼
From depression for ligt. teres to outer side of trochanter major	5¾
Width at condyles	5½
Greater to lesser trochanter	5½
Greater to int. condyle	22¾
Circumference of neck	6¾
Circumference of head	8
Circumference of shaft of middle	5½
Tibia:	
Length from int. tuberosity to int. mal.	18⅝
Width of tibia and fibula at ankle	4
Circumference of shaft (middle)	5⅜
Foot:	
Length	13¾
Depth of tarsal arch	4¼
Girth of foot	10½
Fist metacarpal (length)	3

There was a distinct bossy, "velveay"looking elevation at the postero-internal surfaces of both tibiæ in their middle third.

I have ventured to call this case one of acromegaly on the following grounds: (1) The excessive developement and peculiar shape of the hands, fingers, feet, jaw, and nasal bones. (2) The hypertrophy of the pituitary body and enormous size of the pituitary fossa. (3) The history of mental deficiency and long-standing progressive failure of strength, ending at last in death by syncope.

The enlargement of the pituitary body would appear to be the principal pathological characteristic of this disease, as it has been found to be present in ten out of the twelve cases hitherto reported in which autopsies were held. Its probable size in this case would appear to conform pretty closely to the average hypertrophy as reported, which ranges from 1 inch to 1¼ inches in antero-posterior and 1⅛ inches to

1⅞ inches in transverse diameters, the diameters of the pituitary fossa here being 1¼ and 1½ inches, respectively.

Of course the interesting question suggests itself at once—what connection, if any exists between the acromegaly and the giantism and although the facts at our disposal are so few that any speculation upon the subject must be purely tentative, yet one is tempted to string them together upom some sort of a theory.

In the first place it is interesting to note that giantism so far as accurately recorded would appear to be actually mainly an "acromegaly" extending to the whole extremity (both upper and lower) instead of merely confined to the last segment, the lower limb contributing such a large proportion of the excess of height. An approach to this condition even is recorded in some cases of acromegaly occuring in adult life, in which not only the hand, but the forearm was enlarged. (Pel, Dercun, Long.)

Arnold* reports a case where the shoulder-girdle was thickened and Berkley† one where the clavicles were enlarged. Dercum‡ records another where both forearms and legs and chest were greatly enlarged. The scapula and pelvis were enlarged in Osbornes case §. The forearms, patellæ and clavicles in Pel's case ‖, and the forearm and legs in Long's¶. The bones of the leg were thickened in Péchardre's case **. In the four instances above where the weight was given the average was 215½ pounds.

Then, again, the picture of the giant given almost unanimously by secular (non-romantic) literature, is that of a loose-jointed, weak-minded, stoop-shouldered sort of a being with splay feet, huge hands, and projecting features.

The condition itself appears to be almost a diseased one, as the vast majority of these "freaks" die young, and from all the records obtainable by me, none pass middle life. The few actual ages at death, which I have been able to find, are as follows:

	Height.	Age at death.
	Ft. In.	*Years.*
Charles Byrne	8 2	22
McGrath	8 6	20
Winkelmaur	8 9	22
James Toller	7	24
Tall girl of Basle	7	(*a*)

a In childhood.

We must remember that the actual range in human stature, even in giants, is much more limited than is popularly supposed, or even than is usually assumed by most of us. Popular literature abounds with 9-foot and 10-foot men, but statures above 8 feet are extremely rare, and Du Quetélet even declares that the tallest man reliably recorded was Frederic the Great's "Scottish giant," who measured 8 feet 3 inches. "Chang," the Chinese giant, was only 7 feet 8 inches in height, and Patrick Cotter, 7 feet 10 inches, while the majority of "giants" actually barely reach 7 feet, and it does not seem at all incredible that the same nutritive disturbance which can add an inch to the hand or jaw of an adult can literally "add a cubit to his stature" if beginning its operation during the fœtal or infant life.

Indeed the former would, abstractly considered, appear the more remarkable of

*Beiträge zur Pathologischen Anatomie, Bund. x No. 1.
†Johns Hopkins Hospital Bulletin, September, 1892.
‡American Journal of the Medical Sciences, March, 1893.
§American Journal of the Medical Sciences, June, 1892.
‖Berliner Klin Wochenschrift, 1891, No. 3.
¶Lehigh Valley Medical Magazine, 1891, No. 3.
**Revue de Med., February, 1890.

the two. In adult life the increase merely occurs at the points of least resistance, the ends of the extremities and features, or as Klebs asserts the ends of the long bones.

The situation of the characteristic pathologic change in the pituitary body is in itself extremely interesting and suggestive from an embryonic point of view. Little as is known of the function or physiologic relations of this "gland" it is generally regarded as marking the point of junction of the spinal and alimentary canals (neurenteric canal) and termination at the notochord. This makes it the "uppermost" end of that neurenteric loop which bounds the stature of the embryo and thus developmentally the "highest" point in the body, so that one would almost expect upon *a priori* grounds to find at this point marked traces of any nutritive disturbance affecting the length and size of the body or appendages.

The connection becomes still more suggestive if we accept Beard's ably supported view that the pituitary and pineal bodies together with the pineal "eye" in *Natteria* represent the remains of the primordial mouth opening axially (from which the present mouth and pharynx are a secondary development laterally) and around which the encephalon developed after the fashion of the esophageal ganglia in Mollusks and the "esophageal nerve-collar" in Crustaceans to preside over the structures concerned in securing food materials.

As this is at bottom the primary and essential function of the extremities (including the jaws) we should hardly be surprised to find their nutrition in some way presided over or represented in this region.

Would it not appear probable that at least one form of giantism is merely acromegaly beginning in fœtal or infant life?

NOTE.

Since the abstract of the above was read at Washington, Dr. C. L. Dana, of New York has reported in an extremely interesting paper (Journal of Nervous and Mental Disease, Nov., 1893) two similar cases.

One almost exactly parallel in a Bolivian Indian, 6 feet 7 inches in height and weighing 300 pounds, who presented a well-marked case of acromegaly, including enlargement of the pituitary body. He died at the age of 30 with symptoms extremely similar to Aama's.

The other case was of a giant 7 feet 4 inches in height and weighing, at the age of 20 years, 325 pounds, who presented many acromegalic symptoms, including enormously developed feet and hands. Kyphosis, sclerosis, coarse hair, feeble muscular development, and a curious enlargement at the left nasal and maxillary bones.

Dr. Dana supplies also a valuable "missing link" in the chain of my suggestions by giving a list of six other cases of acromegaly in which the height exceeded 6 feet (ranging from 6 feet to 6 feet 4 inches) and the average weight was 242⅔ pounds.

ESTUDIO CLÍNICO DE LA BUBA.

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RESUMEN.

Sinonimia.—Frambueza, pian, epian, botón de las molucas, dermitis ulcero-fungosa circunscrita, yarrs, kandgé, mebarrha, abukué, etc.

La buba es una enfermedad endémica en ciertas regiones de la zona tropical, trasmisible por contagio, inoculable, caracterizada por una erupción vesículo-pustulosa seguida de ulceraciones fungosas y de evolución determinada.

Descripción clínica.—No existen prodromos. La enfermedad principia por la aparición en los miembros, en el cuello ó en la cara de una vesícula llena de serosidad que pronto se hace purulenta, se rompe y deja en su lugar un pequeño agujero. Al rededor de la primera vesícula se forman otras que siguen el mismo proceso hasta que al fin se constituye una úlcera de base indurada, de superficie fungosa generalmente cubierta por una costra amarillenta que se reproduce sin cesar.

Esta úlcera primitiva, conocida con el nombre de buba madre, es el sitio de comezones al principio y según el sitio que ocupa puede dificultar las funciones de la parte.

La presencia de la buba madre no es un fenómeno constante de la enfermedad, al menos así lo hemos observado en este país. En muchos casos la erupción aparece generalizada desde el primer momento.

En la generalidad de los casos el accidente primitivo desaparece ántes de que las manifestaciones que pudiéramos llamar secundarias hagan erupción; pero en muchos otros la úlcera madre persiste durante toda la evolución de la enfermedad, y en algunos, aunqué raros, alcanza una duración mayor que la del resto de los otros accidentes.

El segundo período, es decir, la generalización de la enfermedad á todo el cuerpo, está caracterizado por una erupción vesículo-pustulosa que puede afectar dos formas distintas: la discreta y la confluente.

En diversas partes del cuerpo aparecen pequeñas vesículas acompañadas de comezón, que aumentan de volumen y se convierten en pústulas llenas de un líquido amarillento que se concreta y forma costras que se desprenden con facilidad. Debajo de estas costras que caen expontaneamente ó son arrancadas por el enfermo, aparece una superficie ulcerosa, mamelonada, fungosa, de aspecto lardáceo, bordes lívidos é irregulares.

Estas úlceras son dolorosas y despiden un olor fétido *sui generis*, á la vez que dan al enfermo un aspecto de lo más repugnante. Se presentan por grupos más ó menos confluentes; no presentan base indurada como la buba madre; los tegumentos que las rodean conservan su consistencia y coloración normales.

Generalmente después de la primera aparición de las bubas que acabamos de describir y mucho antes de que estas entren en el período de reparación aparece otra erupción semejante, y este fenómeno puede repetirse durante el curso de la enfermedad dos y tres veces.

No nos parece racional ni verdadera la división entre bubas húmedas y secas. Creemos que todas segregan un líquido fétido y que la diferencia clínica solo estriba en la mayor ó menor confluencia de la erupción.

La buba es una enfermedad de larga duración: de nueve meses á dos años y más. No presenta fenómenos generales; los enfermos continuan sus ocupaciones habituales; los niños siguen viviendo como si estuviesen sanos; no hay pérdida del apetito ni del sueño; los dolores que hemos señalado en las ulceraciones son muy moderadas.

Como accidentes consecutivos de la enfermedad señalaremos, fuera de la cicatriz indeleble que deja la buba madre, el clavo y la flema salada, como dicen los negros de Venezuela.

El clavo que los negros de Africa llaman osondo aparece en la planta de los pies. Es al principio una vesícula que luego es reemplazada por una escrecencia carnosa semejante á ciertas verrugas y separada de los tegumentos por un surco bastante profundo. Esta escrecencia está rodeada de una base indurada y es en extremo dolorosa sobre todo durante la marcha.

La flema salada se presenta en las palmas de las manos y plantas de los pies. Es una afección semejante al eczema y dudamos mucho que sea un verdadero accidente de la buba. Como esta enfermedad, en la casi totalidad de los casos, afecta á hombres y mujeresque se ocupan de las faenas del campo y están siempre descalzos, es racional considerar que la flema salada sea simplemente el eczema de los trabajadores independiente de la buba.

Etiologia.—La buba es una enfermedad hoy endémica en ciertas regiones de Vene-

zuela, pero que probablemente fué importada del Africa por los negros esclavos. Ataca casi exclusivamente á la raza negra, pero no por esto los mestizos y los blancos están exentos de ella. Se observa en todas las edades de la vida, pero es mucho más frecuente en la infancia. En la vasta región bañada por el rio Fuy es muy raro encontrar un negro que en su infancia ó en su pubertad no haya sido víctima del mal.

La enfermedad no repite jamás, al menos esa es la creencia popular entre nosotros y en un inmenso número de personas que hemos interrogado pudimos comprobar el hecho.

Esto, unido al contagio evidente, demuestra la naturaleza parasitaria de la enfermedad, y es de sentirse que hasta ahora no se haya podido, por medio de inoculaciones experimentales comprobarlo en el laboratorio y aislarse el microbio propio, que por inducción debemos suponer sea la causa de la dolencia.

Nosotros negamos el origen sifilítico atribuido á la buba por muchos autores.

(1) Si la buba fuera una manifestación de la sífilis ¿porqué se encuentra limitada, no solo á la zona intertropical, sino á ciertas regiones de esta zona?

(2) Semejante manifestación sifilítica no podría curar expontaneamente sin mercurio, ni yoduro de potasio, como sucedo con la buba.

(3) Fuera del clavo la buba no deja ningún accidente consecutivo de los propios de la sífilis. Pasadas las manifestaciones de la enfermedad, el individuo queda completamente curado.

(4) La buba ataca generalmente á los niños, en tanto que la sífilis, fuera de la herencia, es una enfermedad de la edad adulta.

(5) La buba madre rarísima vez aparece en los órganos genitales; este es el sitio predilecto del chancro.

(6) Ni el dolor ni la comezón son propios de las manifestaciones sifilíticas y son constantes en la buba.

(7) El sifilítico conserva siempre pléyades ganglionares; el buboso jamás. Si en algunos casos se encuentran adenitis, estas deben ser resultado de infecciones secundarias que desaparecen sin dejar rastros.

(8) La buba madre no deja induración sino una lijera cicatriz como la de la vacuna.

(9) Ninguna manifestación sifilítica permanece estacionaria como la buba durante ocho á veinte y cuatro meses.

(10) La buba no hace inmune al individuo contra la sífilis, ni esta contra la buba.

(11) La herencia no se ha podido comprobar en la buba y sí en la sífilis.

Nosotros consideramos todos estos argumentos incontestables y creemos que la buba es una enfermedad específica distinta de la sífilis, que debe tener un microbio propio.

Contagio.—La buba es una enfermedad eminentemente contagiosa. El contagio es siempre directo, se hace por inoculación. Todas nuestras observaciones demuestran que es indispensable una puerta de entrada, una solución de continuidad. De aquí que la primera manifestación está siempre situada en una región desprovista de vestidos. Rarísima vez se ha observado la buba madre en el pecho, abdomen, órganos genitales, muslos; siempre aparecen en las piernas, brazos, cuello y cara, es decir, las partes del cuerpo que nuestros negros llevan descubiertas.

Es indudable que la enfermedad puede trasmitirse por el coito, pero nosotros no pudimos comprobar el hecho en los numerosos casos observados. Creemos que la rareza de este modo de contagio obedece á diversas razones: primero, la inmensa generalidad de los adultos ha padecido la enfermedad durante la niñez; segundo, la imposibilidad de ocultar la erupción, hace que las personas sanas eviten á todo trance las relaciones sexuales con los atacados por el mal.

La buba puede trasmitirse por la picadura de los insectos, bien que estos abran la puerta de entrada y el germen sea depositado allí por otros medios, ó bien que el insecto lleve consigo el elemento morbífico. El contagio por los insectos está perfectamente averiguado entre nosotros.

Diagnóstico.—La buba es una enfermedad que después de conocida es imposible confundirla con ninguna otra.

Tratamiento.—Los negros de Venezuela emplean como tratamiento de la buba, ciertos jarabes compuestos de zarzaparrilla, cedro y otras plantas indígenas.

Los médicos que ejercen en las localidades en donde reina endémicamente la enfermedad usan el tratamiento mixto de la sífilis y la antisepsia de la piel.

Nosotros no podemos asegurar la eficacia de ningún tratamiento, pero sí creemos que el mercurio y sobre todo el yoduro de potasio, acompañados de una antisepsia rigurosa de la piel, seria la terapéutica racional de la afección.

La profilaxia nos parece muy importante. El aseo esquisito de la piel y evitar el contacto directo con las personas atacadas. A estos medios profilácticos creemos que se debe la rareza de la buba en la raza blanca.

Al terminar este estudio sentimos que el capítulo sobre anatomía patológica quede vacío y nos proponemos en otra oportunidad escribir un trabajo especial sobre la naturaleza histológica de la afección y, si nos es posible, sobre su origen microbiano, que hoy sospechamos por inducción clinica.

CLINICAL NOTES ON AMŒBIC DYSENTERY.

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There is no morbid condition of common occurrence upon which there exists a wider difference of opinion than that of dysentery. The confusion of the medical mind upon this subject has arisen from various causes: First, from erroneous conceptions, imperfect definitions, and incorrect classification of the varieties of the disease as enunciated by the systematic writers upon medicine; second, from the uncertain knowledge of its etiology; third, and especially so, from the nonrecognition by the general medical profession of the causal relation of the *amœba coli* in the production of dysentery, and the wide dissemination and frequent occurrence of this form of the disease.

My attention has recently been called to this subject by a paper entitled "Lime Salts in Acute Dysentery," read by Dr. T. H. Marable, of Clarksville, and published in the Transactions of the Tennessee State Medical Society for 1891. The author describes an epidemic of dysentery which occurred in the limestone region of Tennessee, and makes the significant observation that the disease occurred only in those families who had used the spring water which had been very scarce in consequence of a protracted drought, those using cistern water escaping entirely. He concludes that limestone held in solution in the water when concentrated by a drought will produce dysentery, and discards as unproven the doctrine that dysentery is produced by microorganisms. The fallacy of such reasoning is evident, first, because there has been no adequate proof to show that limestone water, however concentrated, will produce dysentery, and, second, because such a conclusion leaves out of view entirely the probable contamination of the water through the products of fecal and other decomposing animal matter. The water of wells and springs in limestone regions, being supplied by surface drainage, is particularly liable not only to such general poisoning, but also to the specific infection of dysentery.

Having had under observation recently a number of cases of amœbic dysentery, I have been able to confirm the observations previously made by Lösch and Lambl, Osler, Councilman and Lafleur in Baltimore, Kartulis in Egypt, Dock in Galveston, Brayton Ball in New York, and others, as to the causative influence of the *amœba coli*. The views embracing the modern knowledge of the subject, with a correct definition and classification, have been so fully and admirably presented in articles

by Dr. A. Brayton Ball, of New York (Therapeutic Gazette, July and August, 1892), and by Dr. Osler (Practice of Medicine, 1892), that I should not venture in this field were it not for the fact that erroneous doctrines are still taught in the text-books, and still pass current with the profession at large. Truth travels slowly and error is hard to rout.

The points to which I especially wish to direct attention are:

(1) To give my emphatic indorsement to the statement made by Dr. Ball, viz, that "dysentery is not a morbid entity, expressing itself by an inflammation of the large intestine, essentially the same in its sporadic and epidemic forms, in tropical climates and northern latitudes, and varying in its symptomatology and pathology in different cases only in accordance with climatic and other modifying conditions; and that, on the contrary, the term dysentery should be used in a general sense to express a process of inflammations of the large intestine, partly of specific and partly of nonspecific origin."

(2) That the general adoption of the following clinical classification will do much towards dissipating the existing confusion; i. e., acute catarrhal, acute diphtheritic, amœbic, and secondary dysentery.

(3) To call attention to the frequent occurrence and wide dissemination of amœbic dysentery.

(4) To emphasize the probable etiological influence of impure drinking water.

(5) To note the characteristic and uniform symptoms.

(6) To consider the chronicity and difficult cure depending upon the character and location of the lesions.

(7) The necessity of combating the excessive anæmia and wasting by a proper dietary.

(8) The importance of cleansing and antiseptic irrigations.

(9) The inutility of quinine injections in my experience.

(10) The superiority of mild injections of nitrate of silver, with salines, and salol internally.

I will first detail the cases and then briefly comment upon these points.

Case I.—John Carlson, male, 32 years of age, native of Sweden; admitted November 26, 1892; discharged February 15, 1893; came to Galveston on British S. S. *Bona*, sailing from Cardiff, Wales, September 1, 1891, touching first at Vera Cruz and remaining there thirty-nine days. Patient had diarrhea on the voyage to that port, but no blood in the stools. After remaining in Vera Cruz about two weeks actions became thinner and more frequent, blood appearing after he had been in port about thirty days. He does not know the source of the drinking water obtained for the ship, but states it was thick and of a milky appearance. Upon admission to hospital, five days after reaching Galveston, he was having twelve and fourteen bloody and mucous stools during the twenty-four hours. *Amœba coli* present in the stools. Decided emaciation and weakness. The treatment consisted in rest in bed and washing out the colon with hot water, followed by warm solutions of creolin, 1 ounce to the quart of warm water, which, failing to benefit the patient, was followed by injections of nitrate of silver solutions of the strength of 30 grains to the quart. Diet consisted of meat, toast, milk, eggs. Gradual improvement, but subject to frequent relapses. Gained in weight 20 pounds. Stools reduced in frequency; blood and mucus slowly disappeared. Patient discharged apparently cured.

Case II.—Albert Bailey, aged 43 years, native of England. Admitted February 3, 1893. For twenty years he was troubled with constipation, and for the past five years with indigestion. From England he came to the United States about four years ago, living in Michigan until August, 1892, when he came to Texas, walking the greater part of the distance, drinking water from creeks and pools along the railroad tracks. After reaching Indian Territory, found the water bad and often stagnant, and soon after reaching this point in his journey he was taken with severe diarrhea; stools at first thin and painless; after about three weeks abdominal, perineal, and scrotal pains became marked, especially before and after stools; about this time, also, blood and mucus appeared in the dejections. Since the beginning of the attack, about July, 1892, there would be periods of improvement in all of the symptoms, lasting for four or five days, to be followed by relapses with a return of all of the symptoms with the same intensity. In January, 1893, he was admitted into the hospital in Houston, Tex., where he remained ten days, and was discharged as cured.

Three days afterward the symptoms (dysenteric) returned with unabated vigor. Upon admission to the John Sealy Hospital at Galveston, stools numbered about 10 during the twenty-four hours, and were small, bloody, and mucous. Patient had lost about 35 pounds in weight since the beginning of his sickness. Microscopic examination revealed the amoeba coli. The treatment consisted in confinement to bed, injections of nitrate of silver solutions, preceded by free flushings of the colon, occasional administration of saturated solution of magnesium sulphate, with small doses (4 minims) of the tincture of opium. Diet: meat, eggs, milk, and toast. Gradual improvement, varied by frequent relapses. May 1, 1893: By this date, though stools are reduced in frequency to 1 or 2 during the twenty-four hours, examination still reveals the presence of *amœba coli*. June 1, 1893: Patient discharged and employed in wards. Stools contain no mucus or blood; they are normal in color and consistency. Apparent cure, but stools still abnormally frequent, about 3 in twenty-four hours; no blood, rather thin. Patient gained in weight, but still weak.

Case III.—Wm. Brooks; laborer; aged 18 years; native of Virginia. Lived in various parts of the country; that is, Washington, D. C., Pennsylvania, Memphis, Tenn., Texas, and finally in Arkansas, in the bottom lands of the Mississippi and Red Rivers; drank the water of these streams as well as stagnant water in the vicinity. He came to this district (Arkansas) during the latter part of August, 1892, when he was taken with diarrhea; the actions at first were watery, then became bloody and mucous, and had from 9 to 12 during the twenty-four hours. This condition continued for about six weeks, when he went to New Orleans; here he asserts got better, though the number of actions daily were still about three and were tinged with blood, contained mucus, and their discharge was accompanied by tormina and tenesmus. From New Orleans he went to Lake Charles, La., growing weaker and more anæmic. Actions became more frequent, and were accompanied by rapid loss of flesh, 30 to 40 pounds. At times the stools would contain considerable blood and mucus; again they would be watery, of a grayish color, and less frequent. When admitted to the Sealy Hospital, January 26, 1892, the patient could hardly walk from excessive weakness. There was a slight rise of temperature; he was having from 6 to 8 actions daily, these containing rose-colored mucus. *Amœba coli* were found. Treatment: rest in bed, and rather free diet, that is, milk, eggs, meat. Saturated solution of sulphate of magnesium, tincture of opium, followed by hot water sterilized, flushing of the colon, and injections of silver nitrate 30 grains to the quart. On July 4, salol 10 grains and bismuth subnitrate half a drachm were given about three times a day. Condition of patient May 1: appetite good; allowed, with a few exceptions, full diet; gained 14 pounds since admission. Actions reduced to 1 or 2 during the twenty-four hours; no blood or mucous in them. Amœba disappeared. Patient employed about the wards, apparently cured. The patient's general appearance is good, though there is a decided tendency to diarrhea, which is controlled to a considerable extent by salol and bismuth. He has about three actions during the twenty-four hours.

Case IV.—J. Bowen; seaman; native of England; aged 27 years. On S. S. *Bona* from Cardiff to Veracruz, same steamer as of Case No. I. Admitted December 23, 1892, having been at the port of Veracruz 39 days. Was taken sick with dysentery the day he sailed from that point. The bowels had previously been constipated. When admitted there was a slight fever, and 15 to 20 stools, bloody and mucous, passed daily, attended with severe abdominal pain and tenesmus. Amœba found in abundance. Treatment: rest, careful regulation of the diet, saturated solution of magnesium sulphate with tincture of opium, cleansing of colon with warm water, and 2 per cent solution of creolin. Discharged greatly improved; stools reduced to 1 daily, but still containing rose-colored mucus, and showed presence of amœba, indicative of unhealed lesions and certainty of relapses. Unfortunately the patient left the State, and the further history of the case is unknown.

Case V.—William Miller; aged 55; native of Ireland. In Texas since 1876 and in Galveston since 1880. Previous health good. About July 20, 1892, was taken sick with diarrhea, having from 10 to 12 thin, dark-looking stools during the twenty-four hours. This continued about eight or ten days; had some straining, but very little pain was present during this time. At the end of ten days the stools became smaller and contained blood and mucus, and were then more frequent and painful. This condition continued until his admission to the hospital August 26, 1892. Previous to this date he had not been confined to bed nor taken any medicine. When he came under my observation October 1, 1892, he was very much emaciated, having lost from 35 to 40 pounds, and falling off daily. There was excessive anæmia. Stools numbered now from 8 to 10 in the twenty-four hours, and were bloody and mucous; they contained amœba, and their discharge was accompanied with more or less tormina and tenesmus. Treatment: Patient had been restricted to fluid diet, milk and broths; was now allowed meat in abundance, eggs, soups, and bread. Rectal injections of strong quinine solutions were given a faithful trial, but proving useless were discontinued, and nitrate of silver substituted with good results. Same medic-

inal treatment, with irrigations, as in other cases. There was a decided improvement, though slow, which was more apparent in the general condition of the patient. A gain of flesh was obtained, but the bowel symptoms were extremely variable; there would be an apparent amelioration, when the actions would be reduced in frequency and improved in appearance, to be followed by relapses. Thus the condition continued until about March or April, 1892. Becoming tired the patient left the hospital, having gained from 15 to 20 pounds in weight; the stools were reduced to 3 or 4 daily, but still contained rose-colored mucus and showed amœba. After leaving the hospital the patient was not under my care, was subjected to various hardships attempting to earn his living, half-starved, and, discontinuing intestinal irrigation, and taking chiefly opiates, the result, as may have been expected, was a severe return of all the dysenteric symptoms. The bowels became uncontrollable, the desire to go to stool would have to be obeyed immediately or the action would occur involuntarily. The stools now consisted of a little bloody mucus, and sometimes almost pure blood. The patient became emaciated and so weak that he could hardly walk. He was readmitted to the hospital on April 1, 1893; was subjected to the same treatment as previously, that is, warm irrigations with sterilized water, followed by nitrate of silver, 30 grains to the quart, with salol and bismuth internally, and a liberal diet There was a rapid improvement; regained strength and color; there was also a slight gain in flesh, and the number of stools was reduced to 3 daily. Discharged from hospital about June 20. Dysenteric symptoms returned as before.

Case VI.—Adolph Bomjuris; laborer; aged 63 years; native of France. Admitted February 18, 1893. Gave an indefinite history. Dysenteric disease of twelve months' standing, with alternative periods of improvement and relapses. Was taken into the surgical ward in charge of Prof. J. E. Thompson for the treatment of some obscure bladder symptoms. On March 9 he was transferred to the medical ward under the writer's charge. From the date of admission until he was transferred there had been an irregular intermittent fever, morning temperature normal, with an evening rise to from 101 to 102° F. Examination on March 10 revealed bulging, increased area of dullness, decided tenderness, and a slight œdema of the skin over the right lobe of the liver. Suspecting abscess of that organ a hypodermic needle was introduced into the 7th interspace to the inner side of the axillary line; pus was found, examination of which showed the presence of amœba coli. The patient was then sent back to the surgical ward on March 7th, where by surgical interference a large quantity of thick pus, presenting the characteristic appearance of pus from liver abscess, was extracted. The peritoneum was found adherent to the diaphragm. The large cavity was emptied and thoroughly washed out, and a drainage tube inserted. Complete healing took place in about 30 days. There was only a slight rise of the temperature during this period. Since March 30 the temperature has been normal; there is constipation, and patient complains of pain in the hepatic region.

Case VII.—Richard Schuman; native of Germany; aged 32 years; steamboat fireman and railroad laborer; admitted June 1, giving the following history: Previous good health; in November, 1892, came to Alvine, Brazoria County, Texas (near Galveston). February 10 had malarial fever, for which he was treated and cured. February 17 was taken sick with dysentery, having six stools the first day, attended by severe pain in the abdomen, rectum, and anus, each action showing large amount of blood. The stools continued to show blood for about a month; after that they would vary, sometimes thin, of a grayish color for several days at a time; then became tinged with blood and contained mucus. At present, June 9, he is emaciated, having lost 32 pounds since beginning of his illness; his stools number from 12 to 14 in the twenty-fours. Upon admission the stools were thin, of mushy consistency, containing no blood or mucus, although some traces of the latter were found. Microscopic examination revealed *amœba coli*. The treatment consisted of what has already been stated in regard to the other cases.

It is somewhat surprising that the peculiarities of amœbic dysentery and the causal relations of this organism with intestinal fluxes should not have obtained earlier and wider recognition. The observations of W. Lambl, who first described the amœba coli, were published in 1859. F. Lösch, in 1875, confirmed the views of his predecessor. Both are quoted by Woodward, but discredited upon the ground of insufficient evidence. The rapidly growing knowledge of the etiological influences of micro-organisms in other diseases, the natural history of dysentery strongly pointing to a specific cause, stimulated inquiry in this direction; so that we find different observers in various parts of the world, as previously mentioned, demonstrating the presence of the amœba, describing the clinical features and lesions of this form of dysentery. The fact that I can report seven cases occurring in my

service in the John Sealey Hospital since October last indicates the extensive prevalence of the disease in this part of the country; the necessity of its careful differentiation from other forms of dysentery, and also the discovery of possible means of prevention and better methods of treatment.

Strümpel (Practice of Medicine, edition of 1893) describes dysentery "as a disease of the colon excited by an infection with an organized pathogenic poison, about which we as yet have no further knowledge." Loomis (edition of 1889) states that "dysentery is a specific disease, with a characteristic local lesion, which lesion is an inflammation of the mucous membrane and of the solitary and tubular glands of the large intestine." Page (Practice of Medicine, 1892) states that "dysentery is an infectious febrile disease, characterized by inflammation and ulceration of the large intestine, due to a specific poison, the germ of which is not known, but which has a peculiar affinity for the bowel. It may be sporadic or epidemic, is usually acute, though it may become chronic."

A simple contrast and comparison of the clinical events of the cases herein cited, with catarrhal, diphtheritic or secondary dysentery, is sufficient to indicate essential distinctions between these varieties of the disease, and the erroneous conception of it as above defined. Amœbic dysentery is chronic from the beginning; it has no tendency to self-limitation, and is exceedingly difficult to cure. Relapse during the progress of the disease, and even after apparent cure, is the rule; rapid emaciation and profound anemia are symptoms generally present; the stools at times are diarrheic, thin, and watery. Probably a majority of cases of nontubercular chronic diarrhea and dysentery are of amœbic origin. This may be not the case in more northern latitudes, but I am sure such occurs in the South. I can go further, and assert that the amœbic is the most frequent form of dysentery met with in this portion of the country; for, during the period the seven cases here reported were admitted into my wards, there were not more than two or three of the acute catarrhal type and none of the diptheritic or secondary form. Tracing these cases to their origin we find that two of them acquired the disease upon the same steamship in Vera Cruz, Mexico; one in traveling through the Indian Territory and north Texas; one in Arkansas, the Mississippi and Red river bottom country; two in Galveston, and one in Brazoria County, near Galveston. It will be noted that two of these cases originated in Vera Cruz.

In the discussion following a paper by Dr. A. Haddad, of Alexandria, Egypt, read at the International Medical Congress held at Washington in 1886, upon the Surgical Treatment of Liver Abscess, attention was called by Dr. Frank Paschal, of Chihuahua, Mexico, to the frequency of hepatic abscess in that country, due, in his opinion, to the excess of highly stimulating food containing a great deal of red pepper, this being followed by catarrhal duodenitis, inflammation of the common bile duct, etc. But a much more rational explanation can now be given, that is, the extensive prevalence of dysentery, especially of the amœbic form, in Mexico. Amœbæ and other pathogenic organisms are taken into the portal circulation, conveyed to the liver, and produce in this organ characteristic lesions. In one of the cases above mentioned amœbæ were found in the pus obtained from the liver, by means of a hypodermic needle. Osler has found them in the sputum when an abscess had opened into the lung through the diaphragm. In four of the cases cited there was evidence of infection through the drinking water: one drank water from pools and ponds along the railroad in Indian Territory; another one used similar water in the Mississippi and Red River bottom land of Arkansas, and two were taken with the disease after using water in Vera Cruz which was evidently foul.

Contaminated water as a cause of dysentery has attracted the attention of medical observers since the times of Hippocrates. I can only mention a few of the reasons which strongly incline me to a belief in this source of infection. First, it is highly probable that the alimentary canal is the avenue of infection, and that like other specific infections affecting the intestines, for example, cholera and typhoid fever, the stomach is the most natural and obvious inlet. Second, the extensive use by

multitudes of people of water liable to infection through a soil saturated with filth of various kinds, and the possibility of specific infection of such water through the discharges from previous cases of dysentery, make this source of infection highly probable. Third, such facts as those mentioned by Dr. Marable, where in an extensive epidemic of dysentery it was noted that only those who drank cistern water were exempt from the malady, point conclusively to contaminated drinking water as a source of the disease. Fourth, the extensive prevalence of dysentery in armies, camps, barracks, prisons, crowded ships, where a neglect of hygienic laws and impure water supply are apt to prevail. One of the most conclusive instances upon record, of water infection, is that mentioned by Fagge in regard to the prevalence of dysentery in the Millbank prison.

It appears that this disease had prevailed in this prison extensively and for a long time. Dr. Fagge says (Practice of Medicine, p. 197):

In the year 1854 the prisoners ceased to be liable to dysentery, and during the next eighteen years (up to 1872) one death only occurred from that disease or from diarrhea. Indeed, as far as I am aware the immunity has continued down to the present time; now one, and only one change in its hygienic arrangement has coincided in time with this improvement in the sanitary state of the prison. Formerly the water which the convicts drank was taken directly from the Thames as it ebbed and flowed beneath the walls. But on August 10, 1854, the artesian well in Trafalgar Square was made the source of supply to the prison; this has since continued. The change was effected in the middle of a cholera epidemic; six days afterwards the disease suddenly ceased. Enteric fever too no longer attacks the convicts, and the death rate has declined to an extraordinary extent. It is, I think, impossible to avoid the conclusion that the exciting cause of dysentery in Millbank prison was the Thames water, and in all probability the noxious ingredient was derived from the sewage contained in it.

Such facts as these, which could be multiplied *ad infinitum*, indicate the necessity of a careful study of the water, to determine the origin of the amœba, as well as to urge the importance of pure water supply as the best means of prophylaxis. The essential chronicity and difficult cure of this form of dysentery is due to the nature of the lesions, that is, ulceration of different portions of the large intestine, and sometimes of the ileum, with a disposition to infiltration, and undermining the mucous membrane, thus affording a nidus for the development, growth, and multiplication and distinctive work of the microorganisms. The character of the lesions gives the key to the most successful treatment, that is, cleansing the intestine from above by means of salines, of which the sodium and magnesium sulphate are probably the best; thorough irrigation of the colon from below, first with simple warm water, and second with antiseptic solutions for destroying the amœba, and stimulating the ulcerated bowel to heal. For the latter purpose I have tried warm solutions of quinine, creolin, and silver nitrate. Carbolic acid and bichloride of mercury are likely to be absorbed and produce toxic effects. Quinine injections in my hands failed to show any permanent good effects; the organisms would disappear temporarily only. Nitrate of silver in weak solutions, about half a drachm to a quart of warm water, proved more effective than any other agent.

Another point, in which my experience coincides with that of Dr. Ball, is the necessity of combating the excessive anemia and wasting by the use of a more liberal diet than is generally prescribed. We may restrict the diet in catarrhal dysentery within very narrow limits, for, as Dr. Austin Flint has shown, that form of the disease is likely to run its course and recovery ensue in eight to ten days without treatment, restoration of nutrition speedily taking place. But in amœbic dysentery where recovery is a matter of months, and when the tendency is toward profound malnutrition, it becomes essential to combat this result by the early and continuous use of food rich in nitrogenous elements, finely chopped meat, chicken, eggs, rich broths, milk, together with a carefully prepared starchy food in moderate quantities.

Of remedies taken internally I have found but few to be of any distinct service. These are nux vomica and the preparations of pepsin to aid digestion. Bismuth subnitrate in large doses, with salol to control excessive frequency of the stools, has produced good results.

COLD STEEL AS AN ANTIRHEUMATIC.

W. K. VANCE, M. D., Bristol, Tenn.

That the two most common venereal diseases are frequent causative factors of inflammatory rheumatism is a fact that has been long known to the profession. Such an intimate relation exists, for instance, between syphilis and rheumatism that few physicians fail in suspicious cases, or in cases that do not in a reasonable time respond to ordinary antirheumatic measures, to substitute therefor antisyphilitic treatment.

We all frequently diagnosticate rheumatism as of syphilitic origin years after the initial lesion of the latter disease, and generally get satisfactory results from instituting a line of treatment based upon this theory. And yet I should like to ask, How many in this representative body ever think of rheumatism as of gonorrheal origin in the absence of a history of a recent attack of this malady? That such cases do sometimes occur as a sequel to gonorrhea months after the apparent subsidence of that affection, and, after defying all usual plans of treatment, the subjects thereof become confirmed chronic rheumatics, who continue until the release of death living monuments to the inefficiency of our art, is, in my opinion, a fact.

Several obstinate cases of rheumatism that have occurred in my practice have forced me to this conclusion. A brief history of two of these will illustrate the grounds of my belief.

Case No. 1.—J. M.; white; American; 32 years of age; family history good. He had been a victim of rheumatism for a period of eighteen months, during which time he had been totally incapacitated for his business, which was that of a clerk. During these months he had been under the treatment of a most excellent physician; but the patience of both patient and practitioner had been exhausted, and I was called to the unpleasant duty of taking charge of the case.

Instead of the splendid specimen of health, weighing 165 pounds, as I had known him eighteen months before, I found a physical wreck; weight 120 pounds; all the articulations of the body more or less affected; the knees, ankles, elbows, and wrists very much enlarged and almost in a state of anchylosis; heart's action weak, frequent, and intermittent; appetite gone, and ability to digest and assimilate food very much impaired. Knowing the ability of my predecessor as well as something of the line of previous treatment, I prescribed with little confidence of benefit resulting therefrom. During the six weeks that he remained under my care several different plans of treatment were tried, but there was no improvement whatever in his condition.

At the end of this period he decided to follow the advice that I had given at my first visit, namely, to try the virtue of the hot baths and treatment at the Hot Springs, Ark. This he did, and during the two or three months spent there was under the professional care of one of the best physicians at that famed resort. But instead of finding the hoped-for relief he returned in a worse physical condition than when he went, his means exhausted and hope of recovery gone. With a calm determination that was remarkable he informed me that, in his opinion, it would be best for himself and his friends that his life should end, and that he was fully resolved on suicide. That he was perfectly sane and in earnest when he gave utterance to these words I shall never doubt. His condition was indeed pitiable, and I realized that a human life in all probability depended upon my being able to bring some relief to his mental and bodily suffering. Cheering him up as much as I could with the hope of ultimate recovery, the next step was to decide upon some plan of bringing it about, knowing the uselessness of continuing the medicinal and dietetic measures that had been ineffectually used for so long a time. On inquiry I ascertained that he had had three attacks of gonorrhea, the last one antedating his rheumatism more than a year. He denied the existence of any gleet or any other symptoms of stricture, and it was with considerable reluctance that he finally consented to an exploration of the urethra. Examination proved, however, that he was badly strictured, his urethra barely admitting a No. 8 French sound.

At proper intervals I gradually increased the size of the sound used, and soon succeeded in dilating the canal so as to admit a steel sound corresponding to No. 24 on the French scale. In the way of medicine I renewed a prescription I had formerly given him, and had the satisfaction of seeing him improve rapidly from the inauguration of this treatment. Within eight or ten weeks he had so far improved that he was able to walk to the office in which he had been employed and resume work.

His progress towards recovery has been uninterrupted; and instead of the ema-

ciated crippled, despondent rheumatic he was two years ago, he is to-day a picture of health, weighs 175 pounds, has not a symptom of his former trouble except slight pain and crepitus on forced flexure of right knee, and is satisfactorily filling a responsible position on one of our Southern railroads.

Case No. 2.—This case was almost a counterpart of Case No. 1; white; American; 25 years of age; by occupation a policeman; family history good; weight before attack 170 pounds, and a typical specimen of health and vigor. He suffered with rheumatism for more than two years, during which time he had been treated by several local physicians, and likewise by one or two in Philadelphia, with little, if any, beneficial results. Coming as he finally did under my care with a history of several attacks of gonorrhea, I profited by my experience with Case No. 1, found him strictured, and used the steel sound with like satisfactory results. For the purpose of determining the real therapeutic value of cold steel, I purposely omitted in this case all internal treatment except occasional doses of bicarbonate of potassium and hyoscyamus given with a view of controlling the mild urethral irritation. He has entirely recovered, and is at this time a horse-trader, perfectly able physically to endure the hardships incident to that vocation in a mountainous country.

Each of these cases, as stated, had been under the care of skillful physicians for a period of two years. These physicians had faithfully tried different remedies and plans of treatment without affording relief. The patients were relieved, however, and in a remarkably short time restored to good health, after treatment of the morbid condition of their urethras was commenced.

Now the pertinent question is, Were these simply cases of *post hoc*, or did they owe their recovery to the use of the steel sound?

My opinion, based upon the two cases mentioned and a few others with which I have met, is that by correcting the pathological condition of the urethra superinduced by the gonorrhea, the steel sound acts as a curative agent in certain cases of rheumatism after all known medicinal agents have failed.

Again, could these cases be properly classified as gonorrheal rheumatism, which, according to the usual acceptation of that term, must occur during the course of a specific urethritis? Fournier states that the usual period for the development of gonorrheal rheumatism is from the sixth to the fourteenth day of gonorrhea. Some authorities admit that it may develop occasionally as late as the sixth or even twelfth month in chronic gonorrhea. Both my patients stated, however, that they had been free from a discharge of any character for at least twelve months prior to the first manifestation of rheumatism.

Now, the vague idea that has for so long a time pervaded the profession that gonorrheal rheumatism is nothing more or less than a local manifestation of a mild pyæmia might be adduced, on account of the absence of a discharge, by those who hold to this view of its etiology as evidence that the cases I have reported were not gonorrheal. In answer, however, to this objection, I will state that in the cases examined with reference to this point the microscope and the liquor potassæ test both showed the presence of considerable pus in the urine.

The chief strictures in all the cases that have come under my observation have been in the membranous portion of the urethra. It is more than probable that there was a considerable ulcerated patch posterior to each of these strictures and the deep perineal fascia, the pus from which flowed backward into the bladder, and thus became mixed with the urine.

Another more plausible theory as to the etiology of gonorrheal rheumatism, first advocated, so far as I know, by Prof. Peter twelve years ago, is that "the exciting cause is the irritation of the genital organs present in gonorrhea, acting through some ill-understood mechanism."

Now, adopting either of the theories mentioned, the conclusion that my cases were of gonorrheal origin is more than probable.

If this position is correct, it logically follows that our diagnosis of gonorrheal rheumatism should not be restricted to those cases of rheumatism occurring during the acute or even chronic stage of gonorrhea, but that many of the intractable forms of rheumatism with which we meet are results of lesions of the male urethra

so often left as the result of improperly treated or "uncured gonorrhea," of which there is no external tangible evidence, and that a knowledge of this fact and a rational treatment based thereon will enable us to relieve a large per cent of the chronic forms of rheumatism and advance medicine one step toward the scientific position which we all hope to see it ere long attain.

FELL METHOD—FORCED RESPIRATION—REPORT OF CASES RESULTING IN THE SAVING OF TWENTY-EIGHT HUMAN LIVES—HISTORY AND A PLEA FOR ITS GENERAL USE IN HOSPITAL AND NAVAL PRACTICE.

By GEORGE E. FELL, M. D., F. R. M. S., etc., Buffalo, N. Y.

EXPLANATION OF TERMS.

It may be well to premise what I have to say by calling attention to the meaning of the term forced respiration. We understand by artificial respiration an artificial method of breathing for an individual; but since forced respiration has been used with the remarkable results here recorded, it appears that terms should be employed which would be distinctive, and some time ago I made a suggestion to the profession, which seems to have been quite universally adopted, to the following effect:

Auto-respiration.—Respiration by the individual.

Deep respiration.—Forcible respiration by the individual.

Artificial respiration.—This we understand to be that produced by the methods which have been suggested by Sylvester, Howard, Marshall Hall, and others, in which movements of the limbs of the patients and pressure are made with the view of inflating the lungs. In many instances artificial respiration can not be depended on to furnish a sufficient supply of air to the lungs; hence the need for the following distinctive term:

Forced respiration.—Those measures by which air is forcibly passed into the lungs, according to the method first systematically used successfully in the saving of human life by the author.

REPORT OF CASES.

The following cases are reported in detail simply to silence all doubters as to the serious aspect of each case, as in the introduction of a new method into medical or surgical practice it is important to state cases fully. While some of these cases have heretofore been reported, the majority by far of the members know very little regarding the work accomplished by the author or of the value of forced respiration when properly utilized as a life-saving measure.

Case I.—At 12:30 a. m., Saturday, July 23, 1887, I was called to attend Mr. Burns, bookkeeper, residing at No. 49 Morgan street. Patient in a semiconscious condition. His wife reported that he had been drinking heavily for a week past, and had been in the habit of using alcoholic liquors to excess for some years. His present excesses induced him to try chloral to produce sleep, but finding this unsuccessful he added 20 grains of morphine,* with the following result: (According to his statement, he had taken the drug late on Friday afternoon, so that sufficient time had elapsed to permit complete absorption.) When first discovered by his wife, he was breathing stertorously, and was with difficulty aroused. A draught of black coffee was given, which produced vomiting. On my arrival I supplemented this with one of mustard, sodium chloride, and water, which effectually emptied the stomach. This produced no farther effect, as the patient, left to himself, immediately passed into the deep, narcotic condition of opium poisoning. The pupils were markedly contracted, and it was evident a serious case was on hand.

At this time I administered two cathartic pills which I had with me, and at different times minim doses of fluid extract of belladonna; sent for some atropia, and frequently administered the one-sixtieth of a grain hypodermically. To keep the patient awake, he was dressed and two attendants walked him around the block in

*Mr. Burns stated, on questioning, that he had a powder 2 inches long, three-fourths of an inch wide, and about one-fourth of an inch thick, and that he took one-half of it; on measurement, found equal to grains xx.

the cool, pure atmosphere of the early morning. At each round I examined him and administered more atropia. The fourth or fifth round, when within one-half block of the house, his limbs gave out, and while being tugged and jerked along, stertorous breathing began again. He was carried into the house and laid on the floor, as I believed, to die. This was about 3:30 A. M. As the respirations failed and the intervals between them lengthened, Sylvester's method of artificial respiration was employed, and kept up at intervals long after I had given up any hopes of the man's recovery and until I was thoroughly exhausted and, farther, without apparent benefit to the patient. In the meantime I notified the family that the patient could not live.

At this juncture Father Grant, of the cathedral, appeared and performed the last rites of the Catholic Church. At my suggestion, a bed was prepared in the front parlor of the house and the patient laid upon it. From Mrs. Burns I obtained the data for the death certificate, which I confidently expected to file in the morning. I then took a last look at the patient, only to confirm my opinion that death was imminent, and then thought nothing could be done. I was too thoroughly fatigued to think of forced respiration.

The pulse, before Father Grant came, had registered as high as 180, and before I left the house it could have been counted with difficulty. The respirations at 4 o'clock in the morning were five per minute, and when I left the house for home, were intermittent, or with a long intermission followed by a few spasmodic respiratory efforts, and then apparent inanition for a time. I left for home a little after 5 o'clock in the morning, went to bed, and after a sound sleep was awakened by a call about 8 o'clock.

Dr. F. R. Campbell,* who, through illness, had been unable to respond to an early summons from Mrs. Burns, called about 8 a. m., and finding Mr. Burns still alive sent for me. I promptly repaired to the house. The patient was just alive, with respirations, however, not more than one per minute, and the pulse with difficulty to be detected at the wrist. The extremities were quite cold; the face had assumed a cyanotic appearance; pupils still contracted. The doctor suggested that more atropia be given hypodermically, to which I assented. Together we repaired to the drug store near by, had some powders prepared, and on our return were surprised to find the pupils *widely dilated*; it is needless to say no more atropia was administered. The sudden dilatation of the pupils was undoubtedly caused by the paralysis of the nerve centres controlling the iris, and is one of the frequent conditions in the last stages of opium poisoning, and indicative of general muscular paralysis; It is also known as the "dilatation of asphyxia."

Dr. Campbell made the remark, "We can do nothing more now." I agreed with him; but recalling the case of a Mr. Dyke, and my views then entertained, whom I had lost about a year previous after having used all means then utilized by the profession in such cases and failed, I mentioned to Dr. Campbell my conviction that Mr. Burns' life might be saved by opening the trachea, placing a tube in it, and with suitable apparatus keeping up the respirations until the poison could be eliminated. I informed him that I had the apparatus used on dogs in the laboratory of the college at my residence near by. He offered to assist if I would make the experiment. With the aid of a gentleman stopping at the house I obtained the apparatus. On my way I asked Mr. G. H. McMichael, then a medical student, to assist in the operation.

Details of operation.—The tracheal tube was quickly cleaned with a bichloride solution, and the operation of tracheotomy begun at 9 a. m. The hemorrhage was overcome before incising the trachea. The greatest difficulty was experienced in passing a ligature† about the trachea to prevent the air from passing up the throat. After this was accomplished, we were ready to begin the respirations.

The blood passing from the incision was of a dark coffee color, indicating an extreme venous condition. Having been deeply occupied with the operation, I had not noticed the condition of the patient farther than to be able to state that no respiratory effort had been made for some time, and that the dark blue tinge of the face had materially increased.

We began the forced respirations. The lungs were inflated; not the slightest expiratory effort was made, indicating not only paralysis of the muscles of respiration, but loss of elasticity in the lung tissue. No mention has been made of the difficulty encountered after the patient revived and began to move uneasily about. These movements loosened the tube in the trachea and started hemorrhage, and as at this time the patient was depending upon the forced respiration for his life, the

*Since deceased.

†This is now obviated by placing a ring on the tracheotomy tube. The face mask will, however, take the place of tracheotomy or intubation in the great majority of cases. By the method used in this case, it could not be expected that forced respiration would ever come into general use. As it is now used, tracheotomy is not necessary, and it can be applied by any one qualified by a small amount of study.

result was made uncertain. This was the most serious time in the operation. In the house were boarding three soldiers of the United States recruiting service, who were quickly summoned, and performed efficient service in restraining the patient. At this time, and before the tracheal tube was inserted, considerable blood passed into the lungs; it was subsequently coughed out at the opening of the valve of the apparatus. At 12 o'clock midday, after the forced respirations had been under way two and one-half hours, the ordinary tracheotomy tube was substituted for the tube of the apparatus, and the patient allowed to breathe for himself.

This case (No. 1) was reported in a paper read at the Washington International Medical Congress in 1887, and some two months afterwards Case No. 2 occured in Vienna. It will be noted that my first case had been fully published previously. I communicated with Prof. Boehm, of the Vienna Hospital, August 14, 1888, requesting an account of the second case of forced respiration. November 11, 1888, I received from him the following account of the case, which coincided with my views previously expressed regarding the value of forced respiration:

CASE II.

ALLGEMEINES KRANKENHAUS,
Vienna, October 21, 1888.

HONORED CONFRERE: Having just returned to Vienna, I take great pleasure in answering your favor of August 14, 1888.

There has as yet been no authentic report published of the methods which were employed in rescuing Dr. Langer from death by morphia poisoning. I therefore give briefly the important points of the case.

Dr. Langer took, between the 10th and 20th of September, 1887 (nearly two months after Dr. Fell's first operation), six decigrams (8.24 grains) of morphia dissolved in water. As his servant's attempt to awaken him in the morning was fruitless, a physician from the hospital was immediately called in, and he diagnosed morphia narcotism.

The pulse was very small and intermittent; respiration had nearly ceased, the number about five per minute. The pupils were contracted to the size of a pin's head and insensible to light; corneal reflex absent; deep coma; briefly, a typical case of narcotism by morphia.

The attempts to save the patient's life were now made.

The stomach was emptied of its contents and rinsed out with black coffee. This was followed by injections of ether. Both of which were followed by apparent good results. After the respirations had increased to seven per minute, the patient was removed to the Royal Hospital, at which place artificial respiration was kept up from 8 a. m. until 12:30 p. m. As it was now apparent that *artificial respiration was not sufficient** to restore normal breathing, tracheotomy was performed. A canula connected with a bellows was introduced and "forced respiration" (künstlich Luft eingeblasen) kept up for three or four hours. At 5 p. m. the use of the bellows could be dispensed with and our attention entirely devoted to watching the natural respiration.

The attempts which the patient made to breathe for himself continued to increase in number and the next morning he became conscious. Our subsequent treatment consisted in simply caring for the wound and in elevating and enlivening the much depressed spirits of the patient.

Case No. III.†—Mr. J. A. V., aged 43, took 2 ounces of laudanum and some chloral about 9 or 10 p. m., Saturday, December 10, 1887. About midnight his wife heard him breathing heavily, and tried unsuccessfully to arouse him, and sent for a physician. Dr. Lawrence G. Hanley, of the Emergency Hospital, was the first to respond to the call, and was shortly thereafter followed by Dr. Jacob Goldberg.‡ The condition of the patient at this time, 1:15 a. m., indicated that a large dose of some powerful narcotic had been taken. Breathing was stertorus; pulse, 128; respirations, six per minute; and pupils contracted. At 1:40 a. m., Saturday morning, I was called and found the physicians were employing Sylvester's method of artificial respiration. Assuming, at their request, entire charge of the case, I had the patient placed upon a mattress on the dining-room table.

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*Italics mine—G. E. F.

†This was Dr. Fell's second case and the first in which his simple but effective apparatus devised for use on man was used. Without it he is confident he could not have saved this or any of his subsequent cases.

‡Dr. Samuel Goldberg was present later in the case, also a number of medical students.

2:20 a. m.: The natural respirations ceased, or would last but a short time without the aid of the artificial respirations. Pulse, 72 to 84, indicating satisfactory oxygenation of the blood; however, the notes taken at the time show that the natural respiratory efforts were so irregular and deficient that it was difficult to count them.*

The inefficient character of the natural respirations, even when supplemented with the artificial method of Sylvester, was evidenced by the gradually marked increase of cyanosis. Previous to this, when noticing the first good results of the artificial respiration in this case, I informed the physicians that this would be a good time to effectually answer those who believed that artificial respiration would accomplish as much as forced respiration in cases of deep narcosis from poisons which act upon the respiratory centers. I informed them that if the life of the patient could be saved by artificial respiration, or by any other known means, my special apparatus should not be used. It was evident that the artificial respirations were doing little good, growing less and less efficient.

2:30 a. m.: Natural respirations, seven per minute.

2:40 a. m.: Natural respirations, stertorous, twelve per minute, but so "shallow" that little good was effected by them.

3:25 a. m.: Respiration failed. Owing to evident signs of heart failure, it was considered by all the physicians present that the life of the patient demanded the application of forced respiration. Time was given to demonstrate beyond question the uselessness of the artificial respiration, until it was feared that the patient might succumb before the forced respirations could be applied.

3:40 a. m.: Operation of tracheotomy begun. Blood venous. Dr. Hanley remarked at the time that it was "ebony colored."

4:05 a. m.: Forced respirations begun. In a short time the pulse became stronger, and was reduced to 78 per minute.

5:30 a. m.: Pulse, 102. 5:45 a. m.: Pulse, 64. 6:25 a. m.: The patient, up to this time insensible, opened his eyes, stared in a half-dazed manner, and raised his head above the pillow. He recognized Dr. Goldberg (by voice only, as afterwards stated) and, in answer to inquiries, stated that he had taken 20 grains of chloral with some stimulant. This was found to be untrue.

6:45 a. m.: First noted that when forced respiration is discontinued, not the slightest attempt at breathing is made by the patient, even when the cyanotic condition is extreme.

During the progress of the case water was frequently swallowed by the patient. In one or two instances the forced respirations were unintentionally kept up when the patient was swallowing. The glottis being opened at this time, water entered the lungs and was subsequently coughed up and passed out of the valve of the apparatus.†

7:00 a. m.: Pulse, 96.

8:15 a. m.: Pulse, 108. It was found that the patient could breathe for himself, but only for a short time, and the forced respirations had to be continually kept up.

9:00 a. m.: The trachea tube not being secured tightly in the trachea, permitted quite an amount of blood to pass into the lungs, and the air to pass upward into the mouth, so that the lungs were not thoroughly inflated at each inspiration. This blood gurgled ominously at each respiration. With a curved needle encircling the trachea, another ligature (quite unnecessary now, as the rings to tracheotomy tube were not devised or value of face cup known) was passed and tightened about the trachea and tube. The forced inspirations following markedly improved the action of the heart.

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* This case is reported from full notes taken during its progress by the different physicians present.

† This indicates, in part, the value of the application of the apparatus in cases of drowning; also that it would be objectionable to pass a tube into the larynx by way of the buccal cavity when the elimination of poison is important, as liquid, in swallowing, would be apt to enter the lungs. (*See* argument on intubation, p. 81.)

As the poison became more completely incorporated with the blood, the effect of even a short stoppage of the forced respirations was indicated in a weaker action of the heart. At one time the rubber tube connecting the respiratory or air valve with the trachea tube became almost completely clogged with clotted blood. It was removed and thoroughly cleaned, as was also the inner tube of the tracheotomy tube a number of times. Digitalis fluid extract, in half minim doses, was given a number of times; also atropia, one-eighth grain at one time, and smaller doses also. No dilatation of the pupil took place at this time.

The question of keeping up the forced respiration when there seemed to be no prospect of the ultimate recovery of the patient was seriously discussed. I was urged to discontinue the respirations on account of the case being considered hopeless. At one time I stopped the respirations for a longer period than usual, thoroughly discouraged and tired. The man was not dead, and we had to keep it up.

11:30 a. m.: Drank some brandy and water; vomited. As the patient had at this time been given up to die, his family were permitted to see him and "bid him goodbye."

12:00: Pulse, 117. One seventy-fifth grain of atropia administered hypodermically.

12:10 p. m.: Face cyanosed; efforts to breathe made; twitching of toes; respirations not supplying air enough.

12:40 p. m.: Owing to a solution of atropia being placed on or in the eyes, the pupils gradually dilated.* Pulse, 126.

12:55 p. m.: The patient, who had become unconscious for a short time, regained consciousness and drank some water. Pulse, after drinking, 168, weak and flickering. After this more air was administered by giving three movements of the bellows for the inspiration instead of two, as formerly.

3:20 p. m.: Temperature, 100.5° F.

6 p. m.: Pulse, 120.

After nearly 15 hours of forced respiration, at 6:15 p. m. the patient began breathing for himself. Respiration, 14 per minute. This lasted 55 minutes, when, the respirations lowering to 8 per minute, at the request of the patient the forced respirations were again proceeded with.

9:15 p. m.: Pulse, 120; respirations, 14, natural; becoming shallow they were supplemented with the forced respirations.

11:30 p. m.: Pulse, 100.

December 11, 1887, 12 midnight: It is now 20 hours since the forced respirations were begun.

1:05 a. m.: Pulse, 128, strong. The patient has been breathing for himself for the last 4 hours, but has now requested that the forced respirations be used for a time. Since then he has breathed spontaneously. For over 14 hours he could not be left to breathe voluntarily, even for half a minute, without evident discomfort and danger, viz, between 4 a. m. and 6:30 p. m. of the 10th instant, and for nearly 7 hours thereafter the natural had to be supplemented by the forced respirations.

4 a. m.: Pulse, 117. Although oleum tiglii gtt. v. has been administered, no movement of the bowels has taken place. Essence of pepsin, beef peptonoids, milk, and spiritus frumenti given a number of times. Enemata of water, soap and water, with oil and stimulants given also.

Every 6 or 8 hours the catheter was used. Up to 12:30 a. m., 11th instant, and some 27 hours after, 2 ounces of laudanum had been taken, not more than 6 ounces of urine had been drawn from the patient. This large amount of poison (2 ounces) had been going the round of the circulation, producing its maximum effect on the whole system. The left arm was partially paralyzed, the brain congested.

* This may not have been judicious, but it was done under the belief of all the physicians present that the patient could not recover.

Between 3 and 4 a. m., 11th instant, bowels moved for the first time. At 7 a. m. the patient left the table without assistance to use stool. At 9 a. m. tracheotomy tube was removed, wound plugged antiseptically, and patient put to bed. Although very seriously ill for three or four days following, no serious lung difficulty set in and the patient has fully recovered.

The histories of forty-three cases are given in detail.

Medical literature abounds with very little of any value upon the subject. There is no question that experimentation previous to my own had demonstrated that it was almost useless to attempt to save life by this means, but that artificial respiration would accomplish all that could be obtained by artificial means. The opinion also prevailed that more forcible measures than those used in artificial respiration would "endanger the delicate lung tissue," or that the "air vesicles might be ruptured." We may instance the very generally accepted Marshall Hall's Ready Method in Asphyxia, wherein we find the use of bellows or any forcing instrument strongly condemned. Even in some of our visiting lists, where we might expect to find only axiomatic phrases, this rule was laid down until lately with special stress upon the inadavisability of using any forcing measures or instrument.

While forced respiration has been practiced for many years, both here and abroad, upon animals in physiological laboratories, in vivisection experimentation, we have yet to ascertain that such application has taught it to be considered as of value in the saving of human life, the keeping up of respiration in the human organism, or as a means of resuscitation in asphyxia.

Can this be wondered at when high authorities inform us that artificial respiration will supply the blood with oxygen fully as well as forcible measures, or utter statements which convey just such impressions? In Heath's Dictionary of Practical Surgery, under the head of "Suspended animation," this statement appears:

It is important to bear in mind that artificial respiration is purely a mechanical act, and that, if efficiently performed, air must enter the lungs even of a corpse which is hopelessly dead.

In a short discussion which ensued upon the report of my first case, presented to a section of the International Medical Congress at Washington,* several physicians took the ground that the operation of forced respiration was not needed, that artificial respiration (Sylvester's method) would have accomplished as much. With such statements accepted and supported by the mass of surgical literature, it would be ridiculous to assert that the methods employed in the physiological laboratory were considered valuable in the resuscitation of human beings in asphyxia.

I will now defend the position, based upon my own experience, that artificial respiration, as practiced by the Sylvester method, which is conceded to be one of the best, will fail to supply the lungs with air in sufficient quantity to keep up the action of the heart in deeply narcotized subjects, where forced respiration, in many cases, would prove entirely successful. In one of my cases the opinion was expressed by an experienced physician † who witnessed the operation, that the simple institution of artificial respiration, through the bodily movements required, might have proved disastrous to the patient, owing to his weakened condition through loss of blood. The contrast between the two in operation is very noticeable. In artificial respiration the patient is tugged, squeezed, and rolled about, according to the method employed; while in forced respiration he is usually entirely passive and will lie for hours without moving or appearing uncomfortable as long as the latter procedure is properly kept up. In the case just referred to, the life of the patient depended upon the forced respiration for nearly a day and a quarter, and now the patient is as well as ever. The question may yet arise, in desperate cases, as to the propriety of the early substitution of forced respiration for artificial respiration.

When I had made my third operation and saved three human lives, after all usual methods had failed, a gentleman, who presumably was a physician, stated, in an

* September, 1887.

† Dr. Carlton R. Jewett, of Buffalo, N. Y.

article furnished to the Daily Press, that "The resuscitating bellows is as well known to every physiologist as is the use of the stomach pump, and that Dr. Fell learned its use with the other students at a medical college in Buffalo, where its employment was thoroughly taught by Prof. M—— for twenty years." If this correspondent had left out the word "resuscitating" he would have been more truthful, and if he will recall the apparatus used, and the manner of using it—which will be explained farther on—he will see his mistake. Many times during my assistanceship of two years in the laboratory of the medical department, University of Buffalo, when operating upon canines for the purpose of exhibiting the thoracic viscera in action, the animal has been overdosed with the anæsthetic, and the respiration would cease. Under these conditions artificial respiration was always resorted to and kept up by pressure at intervals upon the chest, after which the operation of opening the thorax would be continued, and usually among the last procedures would be the substitution of the forced respiration by opening the trachea and using the bellows. It was not "taught" that even the life of a dog could be saved by forced respirations.

It is not necessary to refer to the literature on this subject further than to state that while spasmodic efforts have been made at times to make use of forced respiration, owing to the improper methods used the results have not proved sufficiently satisfactory to prove it a valuable procedure, but, on the contrary, to condemn it unqualifiedly.

I can not do better to indicate the general aspect of the profession toward this operation than to modify for the present occasion the utterances in my last paper read before the American Medical Association, Detroit meeting, 1892.

It is now about six years since I first saved life by systematically respiring for a human being by forced respiration. Up to the present time about 30 lives have been saved by this means. The method has been given as great publicity as possible by publication in well-known medical journals and proceedings of societies. The fullest detail as to the arrangement of the apparatus has been described, so that the successful methods could be utilized and the apparatus prepared by anyone sufficiently interested. I have always been willing to aid and assist anyone disposed to utilize the method. The most simple means by which the operation could be satisfactorily performed have been detailed, with a view of aiding the practitioner in urgent cases where the complete apparatus could not be obtained. However, what results have been accomplished, as already stated—the saving of 30 human lives have, with some exceptions, taken place through my own individual endeavors.

Many human beings, as the reports of the daily press have indicated, have been allowed to die when preventative means existed which the members of the medical profession could have utilized had they only taken advantage of the statements and facts freely presented to them. It may not be entirely truthful to state that the medical profession in America is ultraconservative regarding the use of "new methods," in the face of the wild furor over "tuberculin," or the Brown-Sequard elixir. The latter quickly proved itself of no value, and the former the best authorities now appear to discredit as anything of a specific for tuberculosis. How has it treated forced respiration—in its success an entirely American idea, and which from the first intelligent application gave results that could not be questioned by even those inclined to be jealous and unfriendly? It has not even been made the subject of special comment in the medical institutions of the day, so that the graduates in medicine of but few colleges in the land are intelligently qualified to carry it out, and medical practitioners are not prepared to use it or apply it when supplied with the apparatus.

This was quite interestingly demonstrated in a case (No. 25) at a time when I was unable to attend, and sent my young nephew with the apparatus to assist two regular practitioners in the saving of a human life from opium narcosis. Although both

residents of my native city, and the methods of forced respiration being very simple, these gentlemen were not sufficiently well acquainted with the simple details of the apparatus to use it intelligently. My student, a young man about 16 years of age, having seen it frequently in use, assumed charge, and saved the lady by his efforts. I only speak of this to show that simple methods require more or less study and consideration on the part of anyone, even capable physicians, who desires to use them intelligently; and I deprecate most fully the assertion of Prof. Horatio C. Wood that any method upon which the life of a human being may hinge may be used by "unskilled persons." Through the simplicity of the methods which may be utilized in forced respiration which have been brought to our knowledge through my efforts consists its great value to mankind—the saving of the life of many human beings has been accomplished at my hands only by the skillful use of an apparatus specially adapted for use upon man, and through practical knowledge which it has taken me some years to become satisfactorily acquainted with.

Another instance which indicates that medical-press notices and publication in State association transactions will not suffice to impress upon the profession the value of forced respiration as a life-saving factor, was instanced in the case of Carlyle W. Harris,* convicted of the murder of his young wife, Helen Potts, through the administering of morphia in fairly large doses. In one report of the case it is claimed that young Harris desired or suggested to the physician who was attempting to resuscitate the young woman that he make tracheotomy, having a vague idea only of its use. The physician appeared to know nothing about the method. In this one instance I have no hesitancy in stating that the life of the young woman could have been saved by my method of forced respiration, and in the event of the execution of Harris (which did take place), we will have to record two lives lost through what will be some of these days almost criminal ignorance of physicians. There are many useless things taught in medical schools. Why not present those of value in the saving of human life and make instruction more practical?

The public press is almost daily recording cases of death from narcotic poisoning or from drowning in which the old methods have failed. Why not try something better, which has succeeded time and again where they have failed and must frequently fail?

QUESTION OF ORIGINALITY.

Regarding the question of the originality of my method, Prof. H. C. Wood has given the impression through his statements before the Berlin congress, that the apparatus I used was similar to that used in the laboratory upon lower animals, so that Dr. John O'Dwyer, of New York, has given public utterance to the statement which Dr. Wood first and, I think, unwarrantably, urged. In an article in answer to Dr. O'Dwyer, on the improved method of performing artificial respiration (*see* Archives of Pediatrics, May, 1892), I show nine marked practical features of difference between the apparatus which I have used successfully and the laboratory apparatus with which I saved my first life by forced respiration. I quote from my answer as follows:

That used in my laboratory† before I devised my forced respiration apparatus for use upon man consisted of a large foot bellows, a rubber tube to connect it with a large brass tracheotomy tube supplied with a valve, which had to be turned by hand to let the air pass into the lungs, and turned in the opposite direction to let it pass out.

With this arrangement, each time the valve is turned, for the inspiration as well as the expiration, the trachea was given a wrench. I have found that it makes a great difference whether you are wrenching the trachea of a dog or a living human being. I overcome this feature of the laboratory apparatus by making my tracheotomy tube and the valve which controlled the air column in separate parts, connecting them by flexible rubber tubing. This would permit the patient to move

* Subsequently electrocuted at Sing Sing, N. Y.

† Medical department Niagara University, Buffalo, N. Y.

about without endangering the trachea. This may be noted as the first feature differing from the laboratory apparatus, as I first used it in tracheotomy cases.

In the laboratory apparatus the trachea had to be ligated around the tube, as Dr. O'Dwyer states, but not so in my apparatus. To prevent this, I screw to the tracheal end of the tube a larger or smaller ring, according to the size of the trachea, which fills up the trachea, preventing an excess of air from passing out by the side of the ring.

This is the second novel feature of difference from laboratory methods.

Again, I made the connection between the flexible rubber tube and the tracheotomy tube so that it could be easily and quickly disconnected. This is an important feature and constitutes the third feature of difference between my own and the laboratory methods.

The valve which controls the air also has some valuable features. First, with it the air can pass into and out of the lungs at all times, except during the forcible inspiration—fourth and fifth differences from that of the laboratory apparatus. Second, the air from the bellows is constantly passing through the valve during expiration, thus allowing the air to immediately enter the lungs from the air valve when the piston is pressed down, without traversing the whole length of tube from bellows. With this arrangement, autorespirations can be assisted instead of interfered with, a factor of importance in many cases I have met with. With it we can instantly change from an inspiration to an expiration and have complete control of the air utilized, which can not be done by any other method of practical value.

This marked the sixth and seventh differences between my apparatus and that used in the laboratory.

In the construction of the bellows I used a diaphragm of rubber dam (now a double bellows without perishable rubber), which equalized and produced a steady, instead of an interrupted or jerky column of air, such as Prof. H. C. Wood unwisely, I believe, suggests in his so-called "cheaper apparatus," with common bellows, although I used a simpler apparatus previously on a human being. Here we have the eighth difference between my own and the laboratory apparatus.

If I wish to present still more features of difference, I might include the air-heater which I also have used in cases of resuscitation of human beings. The eight features of difference mentioned above will, I trust, put a quietus upon the question of similarity between my own and the laboratory apparatus. What I have accomplished in bringing about the knowledge that simple methods may be used has resulted from careful attention to the details of practical import associated with an operation which holds human life in the balance, not by slipshod methods which would have relegated this operation to oblivion and which methods some would try to revive to gain glory where they are entitled to none. If the saving of over 30 human lives, the record of results with which my work must so far be credited, is not an argument in support of my statements, what "under the stars" does or will give credence to human utterance? However, I have overlooked another dissimilarity between the laboratory apparatus and my own—the face mask, which brings the operation within the reach of the unprofessional when properly instructed. Of course, the face mask, everyone will admit who knows nothing about it, was used in the laboratories in the days of Galen. Without joking, however, this constitutes the ninth marked difference between the laboratory apparatus and my own, and yet Dr. O'Dwyer does what appears to me an injustice in speaking of the two as being identical.

I desire to state that, notwithstanding an experience in laboratory vivisection work for eight years prior to my first operation of forced respiration upon man, it was not until this first operation that I was enabled to conceive its great value. All my experiments, the gradual unfolding through operations upon human living beings of the value of the face mask, should give weight to my words above those resulting from experimentation upon dogs; the conditions are very different. All that experimentation upon dogs has revealed as to the value of forced respiration in saving life I had previously demonstrated upon living human beings; when I began my work, as stated, it was not even known that it would save a dog's life.

Now, a few words with reference to the evolution of the face mask. I had begun the operation of tracheotomy upon one of my patients, when my attention was called to the fact that he was dying, the dilatation of asphyxia taking place. I immediately placed the tube of the apparatus in his mouth, closed the lips upon it, and compressed the nostrils; inspiration then being produced, I was pleased to find the purple deoxygenized blood in the tracheotomy incision change to a bright scarlet. I had many demonstrations of this character following, which gave me the idea of the face mask. Having a rubber cup used for cupping purposes, I fitted it to the face and saved several lives with it without tracheotomy before preparing the one I now use.

While the description of an instrument may appear somewhat detailed, and indi-

cate that the method in operation is somewhat difficult, such in this instance is not the case. All there is to forced respiration as I have utilized it is the forcing of air under suitable pressure and control, with proper periodic intermission, into the lungs. It can only be properly done with suitable apparatus. The simplicity of the method should give to the operation its widest range of usefulness; but to become practically acquainted with it, one must see it and study it before he can understand it. With proper instruction, the members of a life-saving or a ship's crew could be taught to utilize this valuable method of saving human life. I presume before the "conservative" (?) medical profession of America or the world will utilize this valuable method that thousands of its members must have their attention specially called to cases of resuscitation through its employment, must personally see it work.

Another matter I may refer to at this time: I believe all will admit that the greatest credit which it is possible to obtain as the originator of a method of wide range of applicability in saving human life consists in the largeness of the list of lives saved by it, and the just appreciation of its value by your fellow-man. There is no higher aim that we as physicians can conceive than that of preventing the vital spark from taking leave of the human organism. If this be true, it does appear unjust, unfair, and unthankful that credit should be withheld from those who are entitled to it, and the medical world, in any section, use these methods without the greatest care in giving to those justly entitled the credit due them. In the mercantile world dollars and cents, with honor, counts; in our profession, reputation only.

This is the only payment which the profession allows those who accomplish results of value in fields unexplored. Indirect financial gain for special service is not honest gain. On this account, therefore, the original labors of physicians should be guarded with the utmost care in all sections of the globe. The following quotations (with additions) from a paper presented before the last (proceedings 1891, p. 181) meeting of the New York State Medical Association will explain my reasons for the above remarks:

Through the kindness of Dr. Thos. H. Manley, of this association, I am enabled to refer to an article in the proceedings of the Paris Academy of Medicine, under the date of June 2, 1891, in which Dr. J. V. Laborde, in a discussion on "Anæsthesia" regarding the dangers of chloroform narcosis, recommends forced respiration, and has devised a face mask with which to perform the operation. This face mask is of metal, with the edges surmounted or faced with rubber, and includes the nose and mouth. It is, "to all intents and purposes," similar in detail to the one I have been using for some years, and with which I have saved a number of lives. Dr. Laborde speaks of his invention as novel, of great future value, declaims on the subject never having been brought up for discussion, etc. The members of the New York State Medical Association, who have been acquainted with my work for the first four years, will agree that our Paris physicians can well afford to look Westward to learn that progress is not confined to Continental Europe. It is quite strange, also, that Dr. Laborde has overlooked the statements of Prof. Horatio C. Wood, in his address on "Anæsthesia" before the Berlin Congress, 1890, in which he distinctly calls attention to my face mask, and which I had been using for two years previously.

I am also astonished by the statement in the Paris Academy report, that noted French physicians have been using my method by tracheotomy with remarkable success, and without giving any credit for its practical introduction to the world from this side of the Atlantic.

At the Paris Exposition of 1888, which had a department to illustrate life-saving methods, one of my instruments was exhibited by Mr. George M. Bailey, of Buffalo, N. Y., who, having witnessed the remarkable case of Julius Bare, in which instance I respired twenty-four hours for my patient before he was able to breathe for himself, requested, in the interests of progress, the privilege of taking it abroad. He had with him reprints of my articles published in the transactions of the New York State Medical Association, which were distributed among some of the physicians and jurors interested officially in the exposition. At that time, through ignorance of the value of my method, they took no notice of my work as being worthy of note as a life-saving invention. Even the representative of the United States Government at the Paris Exposition did not see anything of value in it, although no more remarkable cases are recorded in the annals of medical science than some of the first reported in my memoirs which were placed at the command of these gentlemen, but

possibly not given the attention they deserved. What is most remarkable, however, they appropriated it, utilized it, and now claim originality for methods which I had previously used and first recommended in practical shape to the medical world.

I would not speak thus pointedly did I not believe these gentlemen cognizant of my work through the publications left at Paris. It may be, however, that they did not see them.

Also, let me refer you to a criticism which was made some time ago by a Dr. Herzog, of Hoboken, in which he called attention to an instrument having been devised for forced respiration, some twenty years ago, which had been donated to the Humane Society of London, England. The apparatus consisted of a large cylinder so arranged to force air into the lungs and one to exhaust it. It was costly and cumbersome and undoubtedly was never used to save human life, or if it had been would likely have failed ingloriously.

In justice to the results of my work I must give my answer to the article in question. I stated that "I would not now be surprised if some one should add that Hippocrates had thought of forced respiration, and even devised an apparatus to perform it with. John Hunter did both, and possibly others, but we have no record of any of these noted men having applied their invention to the saving of human life. See Prof. Horatio C. Wood's remarks in his address before the Berlin Congress, in which he says:

But I have not found that either Hunter or Richardson treated by forced artificial respiration an actual case of disease or poisoning.

If these physicians failed where I succeeded am I entitled to less the credit?

In all this apparatus a grave defect existed, in my opinion, in that provision was made to exhaust the air from the lungs; this complicates the apparatus, and, furthermore, is not in accord with physiological conditions, as inspiration is a forcible measure, while expiration, being passive and produced by the elasticity of the fibro-elastic tissue of the lungs, does not call for the utilization of mechanical means to produce it. I also believe that an apparatus provided with means for exhausting air from the lungs would prove a very dangerous instrument to place in the hand of the average physician in an emergency case.

However, no one will question that Richardson, Hunter, the designer of the apparatus mentioned in Dr. Herzog's letter, and several others whom I could cite, have prepared or invented instruments for forced respiration upon human beings.

With all their labor, what did they accomplish? Was a single human life saved by them? Did they demonstrate the wonderful possibilities of the method? Let us see. After my first operation with the instrument used in my physiological laboratory, and with which, notwithstanding its defects or adaptation for the purpose, I had succeeded in keeping my patient alive for nearly three hours, until he breathed for himself, I looked up the home and foreign literature on the subject. Nothing was discovered which appeared to controvert the fact that I was justly entitled to the credit of being the first to systematically and practically solve the question of the value of forced respiration in the saving of human life; or that I had demonstrated, as one physician puts it, "that air can be forced into the lungs without any damage to them." Whatever has been accomplished also should be stated was without any previous knowledge of the failures in the same field, which had antedated my efforts.

I can say, with the practical knowledge obtained from operating upon human beings, that the instruments used in the physiological laboratory do not meet the conditions to be successfully overcome in breathing for a human being for any length of time. They may answer in some instances as a makeshift, but the work is carried on at a great disadvantage, and with many chances in favor of producing, instead of averting, a fatal result. They were never intended to be used upon human beings. The instrument, with face mask, originally devised by myself, in all its practical details, and with which the results tersely detailed in this paper were chiefly accom-

plished, was founded upon the experience obtained in my first case, and the results of my labor with it so overwhelmingly annihilates any controversy in opposition to its use that it is needless to do more than present them to the profession. Had similar results or demonstration been accomplished at the hands of others in the past, nothing could have prevented them from receiving the widest publicity in the medical literature of the day, but no record is found which detracts from the practical value and originality of my labors. As a physiologist, I was acquainted with the apparatus used in the physiological laboratory, from the simple bellows with nozzle poked into the trachea of a dog, to the more complicated constant Sprengle blower with interrupter, which admittedly would be of no use as an emergency instrument.

The apparatus I had used meets all the requirements for forced respiration in man, with or without tracheotomy, and in the simplest manner. It covers* all the methods which can be utilized in the operation, is adapted to be used out of doors in a cold atmosphere, but may be modified by an arrangement to provide a constant air supply and automatic inspirator, which would, however, increase the cost and do away with the emergency feature of the apparatus as now used.

Dr. Herzog's article, possibly without intent, would naturally lead to the inference that the subject is old—not worth considering; its tenor is not uncertain. The truth is that the work in forced respiration, prior to my own, and running through the past century to a great extent, had simply relegated it to the list of unjustifiable procedures. Do we find anything previous, based upon results, recommending us to use forced respiration after all other methods of artificial respiration had failed? On the contrary, we do find in every medical work treating on the subject, the Ready Method of Asphyxia of Marshall Hall, the highest accepted authority, that we must avoid the use of bellows or any forcing instrument.

Now I propose to talk plainly, as it seems entirely unnecessary at this date to mince words upon this subject. The practical introduction to the world of the value of forced respiration in the saving of human life, the demonstrations which indicated its great possibilities, must be accredited to an American, and the work of others in the past had nothing to do with the results obtained by him, which were original in conception and practical in application.

The question simply amounts to the difference between failure and success. Will the credit be accorded to those who failed or the one who succeeded? In this Columbian year I might ask if Christopher Columbus had prepared his ships, but not sailed across the Atlantic, would he have discovered America?

What also must be admitted by those who are inclined to accord justice to whom it is due, is that the practice of vivisection in the colleges and laboratories of the land had no relation whatever to the saving of human life, or had it ever been taught in medical institutions, systematically or otherwise, as of any value in saving human life. For over eight years prior to my first operation of forced respiration upon a human being I had been a practical vivisectionist in the physiological laboratory, and during that time I never heard it even hinted that a human life might be saved by the laboratory methods. (A strong argument is here deduced in favor of vivisection.)

It was in the field of paralysis of the respiratory centres from opium that I began my work with forced respiration, and the demonstrations as to its efficacy, from the first, could not be questioned. Each and every case saved had passed beyond the limit of hope so far as all known and systematically applied methods of resuscitation were concerned. To be denied the credit which should, in all fairness, be accorded to the practical originator of a method of such far-reaching importance in the saving of human life is what I could not and will not quietly submit to. "Honor, gentlemen, to whom honor is due."

* I do not question that different mechanical devices might not be successfully used in forced respiration. They would not supply or accomplish more than I have done in the method recommended.

Let me also correct another impression coming from high authority. Dr. John O'Dwyer, who advocated intubation, states that there are serious objections to the use of the face mask (see his articles, Archives of Pediatrics, May, 1892,) and tracheotomy in forced respiration.

The majority of cases upon which I have operated have been cases of opium narcosis; cases, it is true, which offer the widest demonstrations of the advantage of the method in its long continued use, and yet, it must be borne in mind that the life of the patient is not out of danger until the poison is eliminated from the system.

Now, I am quite sure that Dr. O'Dwyer or no other judicious physician would recommend a method which would prevent the imbibing of fluids, through which means we may most readily aid elimination of the poison. Intubation, which he recommended, would certainly do this in preventing closure of the glottis, and therefore I have not used it; also, it is a fact that one of the difficulties we have to contend with in these cases is the danger of vomited fluids entering the larynx and obstructing respiration. I have lost lives through this occurring. I must contend, therefore, that in such cases tracheotomy offers more hope for our patient than intubation, as there is no interference with the passage of fluids to the stomach. Experience has shown again that intubation will be seldom needed when the face mask offers us as good results without any of the difficulties which must be necessarily met with in intubation. The objections Dr. O'Dwyer urged against the face mask are not in many cases borne out in actual experience; views based upon practical experience must be conceded as of more value than those of a semihypothetical nature. Nearly up to the present time, so far as can be ascertained, I have probably had more systematic operations of forced respiration upon man than all the rest of the physicians of the world combined. What I may say upon this subject is based entirely upon this experience.

Dr. O'Dwyer states that "in forcing air through the mouth or nose of an insensible patient the tongue, unless secured, is almost certain to cause obstruction, or the vocal chords may be forced together by the inrushing air and act as a valve as in paralysis of the abductor muscles, because there is no expansion of the glottis as in normal inspiration." This does not generally hold, I can safely state, from the observations I have made and now repeat tersely.

In my eleventh case, young woman, I used the face mask for 4 hours; my fifteenth case, female, for 7 hours; seventeenth case, female, 2 hours; nineteenth case, old lady, 2 hours; twenty-first case, female, 7 hours; twenty-second case, female, 4 hours; twenty-fourth case, male, 5 hours; twenty-fifth case, female, 2 hours. In all these cases, and many subsequent, for the time mentioned, which resulted in the majority of instances in saving the lives of my patients, there was absolutely no interference with the air passing directly to the lungs. Furthermore, the chest would heave and fall in many cases in the most natural manner. That such results could be obtained by the cheap apparatus mentioned in The Year Book of Treatment, 1891, p. 193, Dr. Wood being given the credit as originator, and lauded as the best, consisting of a face mask, a few feet of rubber tubing, a pair of bellows, and two sizes of intubation tubes (ordinarily not required), I do not believe. With such an apparatus, which it is stated could be used by "unskilled persons," I am quite certain I would have lost many of my patients. In the cases referred to, if too great pressure was produced the œsophagus would expand and cause stomach inflation, but by careful inspirations for a time, followed by pressure on the abdomen, it would pass away without inconvenience.

What appears to me may be urged as facts of value in this connection are the following: The passage to the lungs under ordinary conditions of unconsciousness, except, and even sometimes in swallowing, is always open. The air forced into the lungs does not, as is generally believed, cause a closure of the glottis any more than the deep auto-inspiration of ordinary respiration. Exceptions may be taken to all rules, of course.

If forced respiration by my method, use of face mask, etc., be carefully conducted, the lungs may be as fully inflated as under deep auto-inspiration, and the respirations kept up for a period of time, ranging from one to ten hours, according to size of individual and degree of obesity. Thin, spare patients appear to be better subjects than those of opposite build. In the few cases in which from continued work with complete paralysis the tongue has fallen back and occluded the larnyx, a ligature has been placed through it and the organ held forward. Usually extension of the neck will raise the glottis, but can not always be relied upon; in such cases intubation would be of value. After the face mask has failed, in one or two instances, I have saved life by performing tracheotomy, which was called for through the cases being narcotized by opium (*vide* previous remarks).

As to intubation, it may have its place in some cases of forced respiration, but to urge its value over the use of the face mask, when the latter has accomplished so much, is unwarranted.

SOME QUESTIONS OF PRACTICAL IMPORT.

Dr. J. S. McLain, of Washington, D. C., who has taken considerable interest in this subject and supplied himself with my apparatus, propounded the following questions, which have a practical bearing upon the use of the instrument. The answers may prove of value to all interested:

First question: After padding the face cup, if necessary, to make it fit the face of the patient, is it necessary to make considerable pressure thereon when the air is being sent into the lungs, to keep the air from escaping at the sides of the cup? The amount of pressure will vary in different patients, but not to a great extent if the cup fits the contour of the face snugly. I have used it upon men with mustache or whiskers and it has worked well. It is a mistaken notion that much pressure of air is needed to inflate the lungs in inspiration. The artificial lungs which I have used in demonstrations very nicely illustrate this, and with them the actual pressure used in any case may be readily obtained. (For a description of these lungs, see Transactions of the New York State Medical Association for 1888.) The presence of cyanosis is the most important condition which calls for more active or forcible inspiration. In producing it it should be borne in mind that too great pressure will distend the œsophagus and inflate the stomach and intestines. If this should take place pressure upon the stomach, or abdomen, at intervals, will relieve the condition so as not to prevent the descent of the diaphragm and interference with inspiration.

In the majority of instances I have not found it necessary to hook up the tongue. If it falls back and prevents the air from passing to the lungs a coarse ligature can be passed through it carried out at the side of the face cup and retained in place with very little trouble. Sometimes, but not always, by raising the larynx or extending the head, respirations will be much facilitated.

My experience would lead me to state that forced respiration by the face mask is more readily and successfully applied in the case of thin than in corpulent individuals.

A case in point was that of Mrs. N., who had taken eleven grains of morphia. Artificial respiration, Sylvester method, was of no avail. Four hours of forced respiration, Fell method, placed the lady out of danger. In this instance the slightest movement of the air-control valve would cause the chest to heave when the respiratory centers were almost completely paralyzed. The marked cyanosis was quickly overcome and the most complete control of the inspirations existed. Similar results have been frequently noted. In plethoric cases the results are not so satisfactory, although respiration has been kept up many hours in such cases with good results.

Second question. Is it necessary, when using the face cup, to pry the mouth open and raise the tongue, or will the air enter in sufficient quantity through the nostrils, supposing the mouth to be closed? In the majority of cases, air will enter through the nostrils in sufficient quantity to supply the respiratory needs. If the base of

the tongue occludes the glottis a ligature passed through the tongue, as stated, will aid the inspirations. This will be seldom required.

The object of presenting this paper to the members of this Congress is that through the unquestioned results obtained by the methods first systematically and practically recommended and by giving a clear record of the experiences which brought them about they may be readily taken up and utilized for the benefit of the profession and humanity.

Dr. Pepper, the worthy president of this body, gave his opinion to the effect that the reading of papers, and giving demonstrations before medical bodies would do but little towards introducing a new practice, so that it would be generally utilized by the profession. He urged that I would succeed better by placing into the hands of the well-known clinicians of the country a few instruments * at cost price and await the results of their use. This I will endeavor to do, as there is no evidence that instrument manufacturers will do anything with the apparatus until the clinicians generally have demonstrated that it is a necessity and a valuable addition to our armamentarium. More than this medical opinion must be molded so that it will be considered hazardous to attempt to save life without proper appliances being provided beforehand. A physician of Syracuse, N. Y., telephoned me to send him an instrument, that he had a lady patient in danger of dying from an overdose of opium or morphia. I received the word two or three hours after it was sent and forwarded by express the only instrument I had at my disposal, offering it to the party at less than the actual money outlay I had incurred in preparing it. Next day the instrument came back with the statement that while the physician was at the depot obtaining it his patient died, that now knowing where he could procure one, he would wait until he had another patient before procuring it. If a second patient comes around he will undoubtedly have another death certificate to fill out.

The following letter in answer to an inquiry of Dr. J. Frank, of Chicago, who is supplied with an apparatus, may be of practical value to any one desiring to use the method: "Suppose a case of asphyxia from any cause as opium narcosis, drowning, inhalation of gas, a case of shock from any cause in which the respiratory centers are disturbed or in which the respirations are shallow from loss of vital energy and in which the Sylvester or any other method of artificial respiration has failed or is of no value. Use the apparatus as follows with the parts in the following relations to each other. Face mask or cup—rubber tube connecting it with air valve—air valve —rubber tube connecting air valve with bellows.

With your patient on a table, bed, or floor, as the case may be, press face cup over the nose and mouth and have bellows worked by an attendant at the rate of from 120 to 150 times per minute for an adult and less for infant or youth. For each three movements of bellows press down piston of air valve which permits the air to pass to the lungs, bulging out the cheeks and produces an inspiration. Then release piston of air valve for three movements of bellows, letting the air pass out of lungs and producing the expiration; keep it up. If cyanosis does not pass away make the inspiration a little longer. With the air valve you can absolutely control the outward or inward movement of the air and by watching. If attempts at respiration should be made by the patient you can materially assist them and change instantly from one to the other. The puffing out of the cheeks, heaving of the chest, and vibration of the vocal chords (slight snoring sounds) are all indicators of value in the progress of the work. This method of forced respiration in such a case is doing more than to keep up the life of the patient where all the old methods of Sylvester, Marshall Hall, and other methods of artificial respiration would fail. Through the extra quantity of oxygen supplied to the blood it overcomes, to a degree, the effect of the narcotic, and thus enhances the chances of recovery of the

*One manufacturer made a number of instruments and failed to have any calls for them. Another failed to see any money in it. A company was formed to manufacture them, but did not succeed in effecting any sales. Hence my remarks on this page.

patient. In addition, however, all methods calculated to tone up and invigorate the heart muscle and system generally with those calculated to eliminate the poison circulating in the system must be used. Don't fail to try forced respiration even when the prospects for successful resuscitation seems useless, as I have many instances in which life has been saved when the indications gave little cause for hope.

THE INJECTION IN PNEUMONIA AND TYPHOID FEVER OF SERUM FROM CONVALESCENTS.

By W. E. HUGHES, M. D., PH. D.,

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Before taking up the consideration of the actual cases of these injections themselves, let us glance briefly at the conditions which have led up to them, the evolution of theories which have made them possible and the final results, toward which they are but stepping-stones. And these are all bound up within the problem of immunity, a problem which has ever engaged the attention of observers, a problem which has baffled even theory, and the solution of which will go far toward the rounding out of the circle of medical investigation.

Immunity is natural or acquired. Natural immunity is, first, inherent in races or species, due here either to processes acting along the lines of evolution, or, on the other hand, to the continued failure of the causative microbe to adapt itself to conditions existing in the host; second, sporadic, that is, existing in scattered individuals of a species, a condition resembling in many features natural immunity and difficult of explanation, a difficulty shown by the numerous theories brought forward toward its elucidation and by the warmth of support which every one of these theories has elicited.

The theory which at present is most prominent, and indeed to which all others may in some manner or other be referred, is that in which the cells play an all-important role (phagocytosis), and that which attributes the whole protective power to the blood serum. The old explanation given for immunity before the part played by bacteria in the production of disease was clearly known—that of exhaustion of the soil—has been almost completely cast aside; unfortunately so, perhaps, for, reasoning by analogy with the higher vegetable growths, it is more than possible that this may eventually demonstrate itself to be a most important factor. However, it is not my purpose here to discuss at length the theories of immunity, much less to attempt to decide between them. The ground has been so thoroughly gone over that to reharrow it would be wearisome as well as useless, and, too, the time is not yet ripe. There are as yet too few factors in our possession. Our knowledge does not yet extend far enough to make a definite decision tenable.

There are, though, some facts necessary to be made prominent lest we fall into error. While bacteria are the cause of a disease, yet its symptoms are due not to the bacteria themselves, but to products attendant upon their growth, and the destruction of these products, while causing an abatement of the symptoms, may still have no effect upon the bacteria, and may not be at all concerned in the production of immunity. Again, care should be taken not to identify the action of blood serum with that of blood plasma, for it is well known that while serum may be strongly bactericidal, yet in the plasma from which the serum was drawn the bacteria may flourish luxuriantly. Further, as the object of our investigations is the preservation of life, we must not be led away by theories looking to brilliant immediate results, but rather gather together our facts slowly and surely, looking not for an instant reward, but hoping everything at the hands of the future.

The knowledge that we have acquired of the production of immunity is briefly

this. The introduction into the blood of animals of immune blood, of attenuated bacteria, or of the products of bacterial growth may render these animals unsusceptible afterward to a disease. Whether this immunity is due to a failure of the bacteria to grow or to a loss of lethal power of their products is a moot point; at least this much is evident, it is the result of some change in the condition of the immune animals. Most experiments have been done upon animals; the few on human beings are much the most valuable, but at the same time much more liable to error and to lead to false deductions. It can readily be seen why this must be so; we can not control nearly so completely the conditions which surround a man as those among which a white rat lives.

The first impulse is to attempt to produce a cure, to brilliantly imitate nature or even to improve on her, and stepping in suddenly end a disease. But it must be steadily borne in mind that the production of a cure is not necessarily the production of immunity, cure and immunity may not be strictly synonymous. It is true that after the cure immunity follows, but may not the production of cure be merely a step in the production of immunity, may it not be brought about in various ways and the destruction of the symptom-producing toxines a process so varied and indefinite that even after its nature is fairly understood it may be of little practical importance. Therefore, it would seem possible that, while the destruction of toxines may seem the simplest and easiest way of attaining our end, yet in reality that end can be attained only through a thorough understanding of the deeper processes that underlie the production of immunity, and the end to be attained may be protection rather than cure. The only disease in which such protection has been a perfect success is smallpox, and here vaccination was stumbled upon and its processes are even yet not understood. The only other disease in which efforts have been made to produce results by a process similar to vaccination is hydrophobia, and here the success is somewhat doubtful. On the other hand, in the three diseases, tetanus, measles, and pneumonia, a cure has been striven for by the injection of immune serum. Because a certain result follows a certain procedure in one disease is no good reason why this should hold good in an allied disease. We know too little of the life histories of microorganisms to generalize successfully.

That there are different methods for the production of immunity, and so different methods of cure, is probable from the existence of natural immunity. The blood of animals naturally immune seems to have little effect in conferring immunity, nor does the serum from such blood differ in its bactericidal power from serum from susceptible animals. In the three diseases above mentioned the procedure adopted has been the injection of serum from animals or persons rendered immune by previous vaccination or disease. Here, looking at the results obtained, the theory has been advanced that the cure is brought about by a neutralization of the toxines, and that it is this antitoxic material which confers immunity. In tetanus the method has been a success, in measles at least doubtful. Pneumonia, which more nearly concerns us at present, was experimented on first by the Messrs. Klemperer. They announced the following facts: Animals can be immunized by the introduction into their blood of the sterilized products of the diplococcus; heating these products to 140° F. hastens the process; this immunity is conferred only after the lapse of some time and is attended by fever; the introduction of immune serum confers immunity immediately.

Their paper was soon followed by the publication of other cases. Among others, Dr. W. S. Carter and myself published* a case where we used intravenously defibrinated blood and gave our reasons against a repetition of such a procedure Since the publication of our paper Audeoud† and others have placed cases on record till at the present time there are records of 39 cases, of which all but one have been successful.

* Therapeutic Gazette, October 15, 1892.

† Rev. Méd. de la Suisse Romande, February 20, 1893.

The present series of 13 cases, which I shall ask you to consider, were injected by Dr. Carter and myself. They were selected carefully as being typical and taken at a time when there would be little danger of confounding the result obtained from the injection with the natural crisis. In all serum was used, which was obtained most frequently by venesection, occasionally by blistering. The serum was injected subcutaneously, this having been found to be as efficacious and less dangerous and troublesome than intravenously.

Case 1.—In Philadelphia Hospital: Man (negro), *æt.* 26 years. Pneumonia involving whole of right lung. General symptoms of quite marked severity. Temperature averaging about 103° F. Diplococci in sputum. On the fourth day of the disease, at 3 a. m., 7 c. c. of serum was injected, and again at 9 p. m., 25 c. c. The first injection was followed by no change whatever in the temperature. Twelve hours after the second it fell to 101° but rose again immediately, though never to the height it had maintained before the injections. It was not till the eighth day that the crisis occurred and the temperature fell to normal. After this there was a secondary rise, the normal being finally maintained after the tenth day. Beyond the trifling lowering of the temperature after the injections, there was no effect produced upon the general symptoms. Resolution of the affected lung was rather slow than otherwise.

Case 2.—In Philadelphia Hospital: Man, *æt.* 50 years. Alcoholic pneumonia of moderate severity. Consolidation involving part of lower left lobe. Temperature not high, ranging between 101° and 102°. Diplococci in sputum. On the fourth day 25 c. c. of serum injected, which was followed in twelve hours by a subsidence of the temperature to normal and a complete amelioration of the general symptoms. The man died, however, about a week later of uræmia. The death could in no wise be attributed directly to the pneumonia, convalescence from which was complete. Albumen and casts had been noted in the urine during the febrile period, and it is probable from his history that the Bright's disease antedated by some time the pneumonia.

Case 3.—In Presbyterian Hospital: Man, *æt.* 67 years. Both lungs involved irregularly at the bases, but consolidation nowhere perfect. General symptoms of great severity, typhoid state, low muttering delirium, marked heart weakness. Temperature quite irreglar, ranging between 100° and 104°. Diplococci present in abundance in the sputum. On the ninth day, at 4 p m., 25 c. c. of serum injected. On the next day, at 1:30 p. m., 15 c. c. The injections had absolutely no effect upon either the temperature or general condition and the man died six hours after the administration of the second one. The post-mortem examination showed a condition of lungs suggestive rather of broncho than of lobar pneumonia, although there were present copious virulent diplococci.

Case 4.—In Presbyterian Hospital: Man, *æt.* 40 years. Right apical pneumonia. Symptoms of moderate severity. Temperature averaging about 102°. Diplococci in sputum. On the fourth day at 4 p. m. 9 c. c. of serum injected. At 8 p. m. the temperature commenced to fall, and four hours later it reached 95.4°. Convalescence was rather protracted, though this was probably the result of concomitant conditions. The man gave a history of syphilis and had Bright's disease, dating back at least four years.

Case 5.—Girl, *æt.* 8 years. Pneumonia of right lower lobe. Symptoms of moderate severity. Temperature ranging between 102.5° and 103.5°. On the third day 2 c. c. of serum injected. The temperature maintained its usual range for twenty-four hours, when it commenced to fall, and by twelve hours later had reached normal. The pneumonia was followed by a trifling pleural effusion without any return of fever, but this was quickly absorbed and scarcely at all retarded convalescence.

Case 6.—In Presbyterian Hospital: Man, *æt.* 24 years. Pneumonia of right upper lobe. General symptoms of pronounced severity, verging on the typhoid state. Temperature ranging between 103° and 105°. On the fifth day at 8:30 a. m. 25 c. c. of serum injected. By midnight the temperature had fallen to 100°, delirium had disappeared, skin was cool and moist, and, in short, the general condition was immensely bettered. After this the temperature slowly rose, ranging between 101° and 103°, but never attaining its previous maximum, and the delirium and other bad symptoms returned in a measure. It is perhaps worthy of note that during this period cold sponging produced a marked temporary abatement of the fever, while previous to the injection it had but little effect. Through an inadvertence no further injection was given till the eighth day, when 5 c. c. of serum was used. Promptly after this the temperature fell to 97°. Convalescence was very rapid.

Case 7.—In Presbyterian Hospital: Boy, *æt.* 11 years. Case of moderate severity. Temperature ranging between 102° and 104°. On the fourth day at 2:30 p. m. 11 c. c. of serum injected. By 2 a. m. of the next day the temperature had fallen to 96.8°. Convalescence was rapid.

Case 8.—In Philadelphia Hospital: Man, *æt.* 28 years. Pneumonia of left lower lobe. Symptoms of moderate severity. Temperature averaging about 103°. Diplo-

cocci in sputum. On the fifth day 25 c. c. of serum injected. Twelve hours after the injection the temperature had fallen to normal.

Case 9.—Man: *æt.* 21 years. Pneumonia of right lower lobe. This case was seen from the very inception of the disease and promised in the beginning to be one of only moderate severity. On the second day at 9 p. m. (forty-six hours after the initial chill) 25 c. c. of serum was injected. The temperature up to this point had been constant at 104.4°. At 9 a. m. of the following day it was 103.4° where it continued throughout that day with no change in the general symptoms from those of the day preceding. At 9 p. m. on the third day 40 c. c. more was injected. Twelve hours later the temperature had returned to its original 104.4. At 9 p. m. on that day—the fourth of the disease—45 c. c. was injected; five hours later the temperature had fallen to 101°, but this subsidence was only temporary and unattended by any amelioration of the general symptoms, which had been growing steadily graver. Two days later meningeal symptoms became prominent. Before this there had been but the ordinary delirium of pneumonia or any other febrile state, and on the following day he died. At the time of death the temperature had reached 108°.

Case 10.—In St. Agnes' Hospital: Man, *æt.* 23 years. Pneumonia of right lower lobe. Symptoms of pronounced severity. Temperature ranged between 102° and 103°. On the fifth day 25 c. c. of serum was injected. No effect whatever was produced by the injection on either temperature or general symptoms. He died on the seventh day.

Case 11.—In Presbyterian Hospital: Woman, *æt.* 45 years. Consolidation had involved whole of right lung. The symptoms were of the gravest possible character. Temperature ranged between 102.8° and 103.6°. Diplococci in sputum. On the sixth day at 11:40 a. m. 30 c. c. of serum injected. This was followed promptly by a rise of temperature to 104.4°; then it fell, reaching in fifteen hours 101°, with a most gratifying change in the general condition. After this the temperature was irregular, ranging between 101° and 104°, but it was thought that the symptoms lacked the extreme gravity of the period before the injection. It was not till the eleventh day that convalescence, which was afterward moderately rapid, actually set in.

Case 12.—Woman, *æt.* 48 years. Pneumonia of left lower lobe. Symptoms of rather pronounced severity. Temperature ranging between 103° and 104°. On the sixth day 25 c. c. of serum was injected and a like quantity on the seventh day. Absolutely no effect was produced by the injections upon either the temperature or the general condition. The crisis occurred on the tenth day and convalescence was probably rather more rapid than the gravity of the attack would have predicted.

Case 13.—In Philadelphia Hospital: Man, *æt.* 50 years. Pneumonia of right lower lobe. Condition not at all grave. Diplococci in sputum. On the fifth day 15c. c. of serum injected. On the sixth day injection repeated, this time 25c. c. being used. Neither injection had any effect upon the temperature. Crisis occurred on the ninth day. From the time of the last injection the man complained of pain and soreness at its site—on the outer aspect of the thigh. This spot afterward became inflamed, indurated, and eventually the seat of an abscess, which was extremely slow in healing. There was no evidence of any systemic involvement from this abscess, and convalescence from the pneumonia went on uninfluenced by its occurrence.

Case 14.—In Philadelphia Hospital: Man, *æt.* 30 years. Alcoholic pneumonia. Symptoms of extreme gravity. Temperature ranging between 101° and 102°. Diplococci in sputum. On the fourth day at 4 p. m. 25c. c. of serum injected. Twelve hours later the temperature had dropped to 100°, where it remained till 8 p. m. of that day (the fifth of the disease), when 17c. c. was injected. Six hours later the temperature had fallen to 99.4°. For the next two days it ranged between 99° and 100°; then it rose rapidly and the man died, the temperature at the moment of death being 108.2°. No effect whatever upon the general condition had accompanied the lowering of the temperature following the injections. A short time before death a marked discoloration developed about the site of the second injection, persisting even after death.

Now, what conclusions can be drawn from this series of cases? In the light of my experience with the first case injected, together with the results in other published cases, I must confess to a most distinct disappointment. In cases 1 to 10 the serum used was apparently as perfect for its purpose as could be wished. It would be a useless expenditure of space and time to particularize the cases whence the serum was obtained; a careful study of them has enabled me to formulate no rules governing its irregularity of action. Suffice it to say that they were all cases of undoubted and typical pneumonia, in every one of which the presence of virulent diplococci had been established. In none of them was the interval which was permitted to elapse between the crisis and the taking of the serum more than two weeks; in many of them it was less. Having these serums, then, obtained under identical

circumstances, it was surely to be expected that perfectly regular and definite results would follow their use, but the event proved otherwise. While some of the cases were marked successes, others showed equally pronounced failures. Thus, of the nine cases only five could be claimed as distinctly proving any effect due to immune serum. In another (case 5), while a crisis did occur following the injection, yet the time that elapsed before its completion (thirty-six hours) renders it doubtful that this effect was due to the serum, and the fact that an early crisis is not at all uncommon in children strengthens this doubt.

Of the three cases where no result was shown, in case 1 I am tempted to explain the at least partial failure by the fact that it was in a negro. Seeing that the diplococci in a negro's sputum seem to be so distinctly more virulent than those in the sputum of a white man, it may be imagined that the same holds good in the lungs and that a larger dose of antidote would be required. It is possible that, had the first dose been larger or been followed by others a conclusive result would have been obtained. It seems to be a fact, judging from experiments upon lower animals, that the more virulent the bacteria the less easily antidoted is their toxine. But if the failure here was due to exceptional virulence of bacteria and, consequently, large amounts of toxine we should expect an exceptionally pronounced immunity, granting that toxines have anything to do with immunity; and yet, as will be seen later, the serum of this man rapidly lost its antitoxic power. Case 3 may be explained by the seeming irregularity of the pneumonia, though, on the other hand, diplococci, that crucial test, were present in abundance. From a careful study of the case, in the light of the symptoms and of the post-mortem examination, I am strongly of the opinion that such explanation is not sufficient, and the case must be classed as an unquestioned failure. In case 9 no explanation whatever of the failure can be offered. Everything was favorable to the action of the serum. The man came under observation immediately after the initial chill, the general treatment was carried out under most favorable auspices, the quantity of serum used (110 c. c.) was certainly large enough, and yet blank failure resulted—immune serum did not antidote the toxine.

Can we reconcile these discrepancies? It would seem not, in the present state of our knowledge. That the irregular results were due to causes inherent in the persons of those injected, essential variations in disease processes, or subtle radical differences in constitution, and not to faulty conditions of the serum, is proved by the fact that different results attended the use of the same serum. Thus cases 2 and 3 had the same serum—2 was a success, 3 a failure. Again, case 4 showed a pronounced success, 5 a doubtful result.

The lack of action of immune serum in certain cases might be explained on the assumption, 1, of a quality of diplococci causative of the pneumonia; 2, of a variation in the toxines; 3, of the inadequacy of the antitoxic theory to fully explain the cure of pneumonia and the subsequent immunity.

(1) The quality of the diplococci. While we are still not perfectly familiar with the life history of the specific cause of pneumonia, yet what work has been done, and comparison with other specific diseases render this hypothesis only remotely probable.

(2) Variation in the toxines. Bacteria in the course of their growth produce at least three distinct classes of poisons, the individual action of which is not definitely understood. These toxines being somehow instrumental in the production of the fever, it is on their neutralization or disappearance that the end of the fever depends. But these toxines are constant concomitants of the growth of bacteria, and while, under differing conditions of inherent qualities or environment, it is possible that the toxines are secreted in varying proportions, yet it is not likely that the average proportions would ever be so rudely disturbed as to lead to total failure of a neutralizing agent to act. The toxines must always be the same. It requires too violent a stretch of the imagination to conceive that under practically identical conditions of production in some few aberrant cases an entirely unusual toxine had been substituted. Therefore this hypothesis is not to be entertained, and this then brings us to consider—

(3) The inadequacy of the antitoxic theory. This theory proposes a purely chemical action, and, granting that there is a single specific cause for pneumonia and that the toxines produced are always the same if there be a definite antipneumotoxine, must not its action be the same in all cases? Let me draw attention here, again, to the probable difference between cure and immunity: Cure, or the disappearance of fever, means the destruction of the fever-producing toxines; immunity, the impossibility of bacterial growth or failure of secreted toxines to produce deleterious effects. Are these two conditions necessarily identical? I am driven to the conclusion by consideration of these cases reported that they are not; the neutralization is merely a step in the production of immunity, and its causes will have to be sought deeper down. At the same time there may be a neutralization of poison by substances in the immune serum; but these substances may exist only in the serum and not in the plasma, and really not be concerned in the production of immunity.

While, therefore, it cannot be doubted that immune serum may have a most pronounced effect, yet the irregularity of its action certainly suggests strongly that there are important factors other than the antipneumotoxine concerned in the production of the crisis and the subsequent immunity. What these factors may be it is impossible to indicate, but it would seem probable that they are to be found rather in some condition of the cells than of the blood serum.

One thing in these experiments I have been most certainly unable to do, that is to duplicate the results published by several observers obtained by very small quantities of serum. In the only case where I ventured to use so small quantity as 2 cc. (that of a child, where surely a small quantity would be most likely to be sufficient) the result was practically negaitve.

I have considered hitherto only the first 10 cases, where only perfect serum was used, the other cases were injected with serum which might be supposed a priori to have a less definite effect. In cases 11 and 12 and in the first injection in cases 13 and 14 the serum was obtained from a case of abortive pneumonia, the crisis having occurred on the third day. The case was one of unquestionable pneumonia, diplococci being present in great abundance in the sputum. Such abortive pneumonia can be best explained by the incidence of pneumonia on a case almost but not quite immune naturally, and were the antitoxic theory correct, one should expect a most marked effect, instead of which the results were all purely negative except in case 10, where the result was at least doubtful. This would bear out what has previously been found to be the fact, that naturally immune serum does not protect and strengthen the hypothesis of different methods for the production of immunity.

In cases 13 and 14 the serum used was obtained from case 1—the negro—five weeks after his crisis. Within two weeks after his crisis he has been bled and the serum used with a successful result, but in these two cases the result was negative. Therefore, if these two cases prove anything, serum, which was at first actively protective, may lose its antitoxic power after the lapse of five weeks.

From a therapeutic standpoint the results of the injections are disappointing. In the ten cases where perfect serum was used there were three deaths. As this is certainly not less than the ordinary death rate in pneumonia, as a treatment, purely, of pneumonia serum-injection would scarcely commend itself. With the imperfect serum the death rate was about the same, one in four.

The injections are, however, if carried out with proper precautions, perfectly harmless. In none of the cases, either of pneumonia or typhoid fever, were any bad general effects noted. In two cases, 13 and 14, there was local inflammation following the injection, but as the serum used was obtained from one man at the same time, and as, owing to the fact that it was not obtained under my personal supervision, it was in all probability contaminated, this result might have been avoided. One word of caution here about the serum—it must not be obtained from a case where there is any suspicion of kidney-lesion, for Dr. Carter and I have found that serum drawn from victims of Bright's disease is capable, when introduced intravenously into dogs, of producing nephritis.

TYPHOID FEVER.

Stern* has found that white mice injected with a mixture of typhoid bouillon with serum from a recent convalescent from typhoid fever survive, while those treated with unmixed bouillon die. This would seem to indicate some antidotal properties in the serum. Though it is scarcely to be supposed that from two diseases so dissimilar as typhoid fever and pneumonia the same result would be obtained by the injection of immune serum, yet the following experiments were undertaken with the hope that some effect would become apparent. The serum obtained was from convalescents in whom somewhat less than two weeks had elapsed since the end of the fever. It was obtained by means of venesection.

Case 1.—In Philadelphia Hospital. Man, *aet.* 30 years. Case of average severity. Mild nocturnal delirium. Bowels moderately constipated. Heart strength well preserved. The history and symptoms pointed to the ninth day as the day on which he came under observation. The temperature would have ranged probably between 102° and 104°, but sponging and bathing kept it between 100° and 103°. On the twelfth day, at 7:15 p. m., 60 cc. of serum was injected. At midnight, after sponging, the temperature was 98.4°. Previous to the injection it had never been reduced by sponging or bathing below 100°. This seemed to inaugurate the gradual defervescence of the temperature. On the fifteenth day it reached normal in the morning, and from the twenty-second day on it was permanently practically normal. Convalescence was rapid.

Case 2.—In Philadelphia Hospital. Boy, *aet.* 19 years. First seen on seventh day. Light case; very slight nocturnal delirium. Two or three stools a day. Heart quite weak. Temperature ranged between 100° and 102°. On the twelfth day, at 7 p. m., 20 cc. of serum injected; 11 a. m. next day temperature 98.4°; then it rose to 101°. Injected again, at 5:15 p. m., 20 cc. Two a. m. next day temperature 98.4°; then it rose, till 6 p. m. it was 100.4°, when he was again injected with 20 cc. of serum. After this the temperature rose, till at 9 p. m. it was 101.8°. It slowly settled after that, and convalescence set in on the eighteenth day.

Case 3.—In Philadelphia Hospital. Boy, *aet.* 18 years. Came under observation on the eighth day. Case graver than the preceding. Quite marked delirium. Heart rather weak. Very slight diarrhœa. Temperature ranged between 102° and 104°, but could be depressed to 99° by sponging. Injected as follows: twelfth day 10 cc. of serum, thirteenth day 10 cc., fourteenth day 25 cc. No effect was apparent on the temperature till the fifteenth day, when it ranged between 100° and 101.8°. It gradually fell after that, remaining at normal from the twentieth day on.

These cases were none of them especially grave and would certainly have recovered in the natural course of events. The type of typhoid fever prevalent was mild and irregular, and these cases were selected as being the gravest and most typical obtainable at that particular time. Some of the companion cases ended as early as the end of the third week, and it may be that the cases above recorded ran a normal course uninfluenced by the injections. Still it is unusual to have three consecutive cases of typhoid fever terminate as these did on the twenty-second, eighteenth, and twentieth days, respectively. If the serum had any immunizing effect it acted as would have been expected, not by producing any sudden fall of temperature, but by bringing on the gradual termination of the fever sooner than it would otherwise have occurred. In spite, then, of the mild nature of the cases and the somewhat irregular action of the serum I am inclined to the opinion that the serum had some effect. It is unfortunate that it could not have been tried upon some severe cases.

It affords me great pleasure to express my thanks to Drs. J. H. Musser and D. F. Woods for their kindness in placing at my disposal cases of pneumonia under their care in the Presbyterian Hospital, to Dr. J. P. C. Griffith for the use of a case in St. Agnes' Hospital, and to the resident staff of the Philadelphia and Presbyterian hospitals for assistance in the observation of cases.

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*Deutsche Med. Woch., September 15, 1892.

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Dr. M. M. Ponte, Caracas, Venezuela.

The section met in the hall of the medical department of the Georgetown University.

In the absence of Dr. Guitéras, Dr. Joshua M. Van Cott, honorary president, took the chair.

PAPERS READ BEFORE THE SECTION.

THE STATUS PRÆSENS OF THE ÆTIOLOGY OF CANCER.

By J. M. VAN COTT, Jr., M. D.,

Professor of Pathology at the Long Island College Hospital, and Director of the Department of Histology and Pathology, of the Hoagland Laboratory, Brooklyn.

In the last three years, and up to August of this year, no less than eighty-seven theses have appeared in various languages treating exclusively of the ætiology of cancer. Various theories have been propounded in attempted solution of the problem, and as many claims made that the goal had been reached, and cancer stood amongst the pathologic occurrences in the human body for which a definite origin could be shown.

Since bacteriology has made such enormous strides, and since these organisms have been proven to be parasitic to man, and definite forms connected causatively with specific forms of disease, it is perfectly natural that attempts should have been made to determine some bacterial organism as the responsible factor to the production of cancer; but since the exhaustive work of Sche this effort has been abandoned, it being generally conceded that if an organism be at hand in cancer it is not a plant, but some low form of animal life.

There are three recent theories of the ætiology of cancer at present claiming particular attention throughout the scientific world, and each having its plausible side. One relates to indirect cell division, and is styled by its originator, Hansemann, "Assymmetric Cell Division in Cancer and its Biologic Significance." The second, which has for its advocates such men as Podwyssozki, Sawtschenko, Soudakewiz, Sjöbring, Pfoa, Ruffer, Russell, Pfeiffer, *et al.*, supposes that an intracellular, or intranuclear parasite—according to some a coccidium, to others a psorosperm, and still others a gregarina—infests the tissues and through its presence induces a lawless growth of epithelial and connective tissue elements.

The third supposes that cancer is parasitic; that the parasites are animals, but that no epithelial elements exist in these neoplasms at all, the polymorphous bodies found in the growth being in reality not epithelial cells, but the parasites themselves; and that these parasites produce a toxic substance, cancroin, which is responsible for the so-called cachexia. (Adamkiewicz.)

Such widely different ideas are evidence enough of our lack of definite knowledge on the subject and the difficulties at hand.

And yet on careful analysis of the three hypotheses, there are many points in each which may be made to harmonize, and which are in keeping with the clinical facts at hand.

Bacteriologic research has taught us much regarding parasitic affections, aside from the special action of specific forms of germs. It has thus been pretty clearly shown, that what is called "normal resistance" inheres in the tissues of healthy individuals, which prevents parasitism. Much light also has been thrown upon the relation of heredity to parasitic disease. It has further been shown that location has important bearing upon parasitic infection, some points being far more vulnerable than others. In the same way trauma is definitely proven to bear direct relation to the entrance of parasites into the tissues. And in this connection it has been abundantly shown that parasites are prone to focus at points where a "*locus minoris resistentiæ*" has been established (in the tissues). Finally, contagion has been settled as a fact in diseases of known bacterial origin. So that these various conditions may be regarded in the light of bacteriology as directly associated with

many parasitic affections in greater or less degree; and if they can be shown to be so related to cancer, this too should be regarded *à priori* as probably of parasite origin.

One other fact connected with cancerous development should be considered, i. e., that primary foci always originate in epithelial tissue, showing the purely local origin of the disease; the tumor belongs originally to the homologous growth.

The experiments of Waterhouse and others go to show that, so long as the healthy tissues have not been devitalized they have the capacity to resist the action of pyogenic and other germs to an astonishing extent; but that when the tissues become damaged so as to show a lessened resistance, they are readily seized upon by these organisms, which may then grow and produce their most deadly effect. No one knows just what heredity is, more than that it seems to be a transmitted susceptibility to the development of disease; and bacteriology has positively shown that, even when an individual is born with a certain disease, it is only hereditary in that the offspring is capable of supporting the parasite which is its real cause. It is hard to fix an accurate standard of normal resistance, but this does not prevent the recognition of a reduced resistance, and it is this reduced resistance which is hereditary in many instances.

How far these facts can be applied to the growth of cancer is a very pertinent question, because, if it can be shown that they do in any important measure apply to these neoplasms, it would be difficult to avoid the conclusion that the disease is parasitic.

That there is a normal resistance to the growth of cancer in tissues is shown by the fact that repeated efforts to transplant the cancer tissue into healthy individuals have failed, while autoinoculations have been successfully made.

There can be no question as to the inherited tendency of some individuals to contract cancer. This has been distinctly proven for a long time. Whole families seem to be capable of harboring the process for successive generations. It is equally certain that, just as in tuberculosis, persons may acquire cancer in whom can be traced no hereditary taint whatever.

As to location as a factor in cancerous processes there seems to be a good deal to show that it does bear close connection with its origin. It is a significant fact that primary cancer has not been known to develop in places where there is not contact with the external air, and Andrews has, amongst others, studied the locations of 7,881 primary carcinomata as illustrating the probability of a cancerous microbe.

In any event cancer is prone to originate at points in the body which are constantly subjected to contact with various foreign substances oftener than at any others.

There would seem to be a close relationship between this fact of location and trauma. Abundant proof has been derived from clinical observation, that trauma is often associated as the exciting cause of cancer; and regarding as trauma any mechanical injury to the tissues, independent of its degree, it is easy to see how this might operate to enable the occurrence of this disease through the establishment of the "*locus minoris resistentiæ*." The low grade of vitality of scar tissue is well known. Rudolf Volkman has collected 128 cases of cancer developing from scars, ulcers, or fistulæ of the extremities. At least six writers have claimed by title of their papers directly that cancer is contagious and infectious, and there seems to exist a close relationship between trauma and tumor development, as evidenced by such an occurrence as the development of epithelioma upon the penis of a man whose wife was suffering with similar disease of the cervix uteri.

Clinical histories are perfectly familiar to those who have been on the alert to find them where it would be exceedingly difficult not to regard cancer as contagious.

It is also significant that primary cancer is homologous to a tissue always found in exposed portions of the body, and whose ultimate elements are regarded by cytologists as to an extent, and from the relative standpoint, wanting in resistance—a fact supposed by them to be due to their high state of differentiation.

Reasoning by analogy, there are strong proofs of a general nature in favor of a parasitic origin for cancer, for it has been distinctly shown above that the same facts which have been determined regarding the parasitic nature of the bacteria—i. e., normal resistance, heredity, location, trauma, the locus minoris resistentiæ, contagion—are all definitely related to the development of the disease.

Furthermore, the progress of cancer is very suggestive of a parasite in its resemblance to the progress of other infectious organisms; the tendency to form colonies or foci and to traverse the path of the lymphatics is exceedingly significant. Such considerations as these are ample warrant for the eager search at present in progress the world over for an organism which shall stand the test of Koch's law of the pathogenesis of germs and be competent to produce under proper circumstances cancer at will. In this hunt for spoil we labor under the one great disadvantage that no one has succeeded as yet in inoculating the lower animals successfully with cancerous material. There is an exception to this: One observer has succeeded in getting carcinoma to grow in rats.

Success in this line would very soon put us in position to progress more rapidly in the quest.

In considering the general questions involved in the parasitic theory of cancer it must not be forgotten that there are those who are bitterly opposed to the idea, and who claim for the various appearances in cells which have been denominated as parasites that they are really the results of pathologic degenerations of the cells. To establish this claim it must be clearly shown that the intracellular inclusions behave in a manner towards reagents similar to known forms of degeneration. It is obviously just as unfair to claim a degeneration the nature of which is entirely obscure as to claim for some adventitious form in a cell that it is an animal without giving at least a plausible reason for it.

Lukjanow has made it clear in his classic work on the "Elements of a General Pathology of the Cells" that degenerative processes in the cells are susceptible of classification, and insists that visible degenerations should respond to known microchemic reagents.

As an example of what is meant here, Russell's eosin bodies should be made the subject of most careful analysis before any definite stand can be properly taken concerning their true nature. The fact of the matter is, that we do not certainly know that parasites can not exist in cells without causing them much harm, and indeed for an indefinite period.

Hansemann's theory of "asymmetric karyokinesis" is based upon present knowledge regarding the indirect division of cells.

Flemming, Rabl, Carnoy, and others have shown that under normal circumstances karyokinesis progresses through a series of five phases. The first two of these are called "prophases," the last two "anaphases," the third middle or "metaphase." These phases consist of changes in the arrangement of the chromatin fibrils with regard to each other and their relation to the achromatin. First comes the mother-skein or spiral; second, the mother star or aster; third, the equatorial plate (metakinesis); fourth, the double star or diaster; fifth, double skein or spiral.

During these phases the achromatin fibrils vary in shape and relation, and the protoplasm of the cell is seen to contain exceedingly complicated structures, such as peculiar polar bodies and attraction spheres. During this process the nucleus has become divided in two, and finally the cell itself, with the result of two independent elements.

These phenomena have been utilized by pathologists to determine the progress of tumors, rapidity of growth being found in correspondence with the number and variety of karyokinetic figures.

Arnold, Martin, and others have further shown that under pathologic conditions a nucleus may undergo indirect division into three, four, or more daughter nuclei.

Finally, Hansemann has shown that many cancers contain cells in which asym-

metric nuclear division into unequal daughter nuclei has occurred through the karyokinetic process. He declares that these daughter nuclei differ materially not only in size, but also in the number of chromatin segments they contain. He further supposes these nuclei with the resulting cells to still possess the property of reproduction, but denies to them their normal function. The larger of these unequal cells he supposes to be transformed into the cancer cells, with resting nuclei.

In support of his view that through the unequal indirect cell division the function of the cell is lost, Hansemann refers to the work of V. Beneden, Weissmann, and others which originate the theory of panmerismus, "which says that the biologic properties of a cell are bound up in definite formed elements of the cell, which elements originate from more than one molecule, and which, through growth and division, transmit the biologic properties of the parent cell to the daughter cells."

Nageli and Weissmann call this substance "idioplasma," Hugo de Vries "pangene."

These larger cells, according to the author of this very able article, having lost in the course of asymmetric karyokinesis portions of idioplasma, have lost also their balance and become, according to him, "anaplastic," i. e., from cells of high differentiation they become cells of lower development; and for this very reason he regards it impossible that the cells of cancer should be embryonic, because an embryonic cell must *a priori* contain all the potentialities requisite to higher differentiation. His experiments with the embryonic cells of rabbits, the results of which tend to support this view, are exceedingly ingenious.

The weak point in Hansemann's theory, or, better, what it lacks, is any conception of the cause which underlies the asymmetric process. He shows plainly that it is present in all of the cancers and in none of the benign growths and tissues he examined; but as to just what has occasioned this deviation from normal karyokinesis is not even hinted at in his paper. One statement only might be regarded as suggestive, i. e., the view of Klebs that the entrance of leucocytes into epithelial cells resulted in a fertilization of the epithelial cell through an increase of chromatin.

As Lukjanow says, "pathologic processes are often accompanied with increased, and sometimes abnormal, karyomitosis; but we are yet in the dark as to the exact relation between the two."

The prime point in the theory of Hansemann is his determination of the fact that asymmetric karyokinesis is constant in cancer, and his conclusion logical that the altered chromation is cause sufficient for the production of unbalanced cells.

From our standpoint there is nothing in the theory which forbids the idea of a parasite for cancer; on the contrary, it may very well be that the asymmetry in the chromatin is a result of the untoward influence of either an intracellular or intranuclear organism.

It would fill a book to discuss all the merits and demerits of the various species of parasites supposed to be specific for cancer, nor does the writer of this paper feel at all competent to do so intelligently, and he is not alone in this, for no less a one than Mallassez has well said "that extreme caution is to be observed in classifying these low forms which are found to infest the cells." The thought occurs, however, that no one animal form is necessarily the specific cause of this disease. Analogy would seem to bear this out: e. g., pus was at one time supposed to be caused by one germ; now it is known that at least six organisms can produce suppuration; and my friend Dr. Bristow, of St. Mary's Hospital, Brooklyn, has recently had a series of hospital cases of traumatic suppuration where bacilus pyocaneus and bacilus coli commune were found in pure culture.

As to just what the relationship between the parasites and asymmetric karyokinesis may be is not entirely clear. Lukijanow says, in a general way, that disease processes are, some of them, evidently the cause of increased karyomitosis, and, following Arnold and others, makes an effort to classify the chief varieties of indirect segmentation occurring in pathologic processes.

Reasoning from Hansemann's standpoint, two views might be held, the first of which would depend upon the capacity of the parasites to either destroy absolutely some of the chromatin segments, or by virtue of their mere presence to modify their potential energy as to inhibit the normal karyokinetic cycle, with the result of cells, such as Hansemann describes, which are only partially differentiated, but which, having descended from highly differentiated cells by an inverse process of retrogression, have at once gained in virility and lost in balance and function. Having once reached the lower plane and the power of regeneration lost, it is not hard to conceive a lawless development of cell elements such as is characteristic of cancer.

The other view is suggested by the theory of Klebs, of the fructification of the epithelial cells by leucocytes. Klebs believes that leucocytes may gain entrance to the cell, and that the latter may sustain an increase of chromatin by deriving it from the former.

Arnold, in an article in Virch. Archiv as late as last June, has shown that the white blood corpuscles have astonishing energy and great constructive power. His experiments were conducted with sterilized elder-pith plates and similarly prepared glass tubes, which were introduced, under antiseptic precautions, either into the lymph sac or peritoneal cavity of frogs.

Summing up his conclusions he says:

In all experiments mono, tri, and multi neuclear, also polymorphous, cells were found at a time when the participation of the fixed tissues, i. e., the histogenetic migratory corpuscles, was excluded, which therefore (the cells) could only be of hæmatogenous origin.

While some cells disintegrated others transformed themselves into epithelioid, giant, spindle, and branched cells, at a time when they could only be treated as hæmatogenous migratory corpuscles, throughout the entire series of experiments.

Recognizing two facts, first, the power of foreign bodies (in Arnold's experiments elder-pith plates and tubes) to stimulate or mobilize the white blood corpuscles, and, second, the remarkable potential energy of the white cells when excited, it is only necessary to attribute to the possible cancer parasite a role similar to that of the other foreign bodies and adopt the view of Klebs that these white cells do fructify the epithelia, to form a reasonable theory as to the exact origin of the polyhedral cells in cancer and the relation of the parasites to the process. Could such a hypothesis be proven, it would immediately explain the relatively few parasites to the number of cancer cells, a fact which is in strong contrast to bacterial parasitismus.

The weak point in the theory is two-fold. No one has ever actually observed the phenomenon of the transmission of chromatin substance from a white corpuscle to an epithelial cell, and such an idea would seem to be inhibited by the theories of Minot, Weissman, and others of the hermaphroditism of cells.

For a cell to be fertilized it must, according to these theories, at least in the ova of nonparthenogenetic individuals, first lose the male portion of its chromatin, and second acquire the male portion of chromatin from a genetically entirely different individual.

Assuming prima facie the soundness of these theories, it is dificult to conceive of a productive fusion between the cells of the same individual, no matter how different they may be from a differential standpoint.

Such a train of thought leads naturally up to another, which is also suggested by the third claim mentioned at the outset in this paper, i. e. the theory of Adamkiewicz, that what we have always regarded as epithelial elements in cancer are in reality the true parasites themselves.

Adamkiewicz draws attention to the facts that the cells of cancer have no "cement substance," that they produce a very toxic substance, "cancroin," and, further, that they have power of motion resembling that of the amœba—facts which are at direct variance with the normal behavior of epithelial cells.

There is some plausibility in these conclusions, but they lack what must always be the crucial test—and which would certainly seem should have been possible to such large and abundant parasites—they have not been cultivated.

Taking the hint of fructification from Klebs, and admitting the points in dissimilarity between cancer cells and epithelia, it is not entirely unreasonable to suppose that the elements of cancer are in reality the offspring of an accidental conjugation between parasites and epithelial cells.

In any event, the peculiar features ascribed to the cancer cells by Adamkiewicz form very tempting arguments in favor of such a conclusion; for they preserve not only (at least to an extent) the motion inherent in the low forms of animal life, but also the secretion of epithelial cells, or better secretion in a modified form, and lose their cement substance.

In such a view are crystallized all the others—asymmetric karyokinesis, parasitismus, fructification, and that which holds the cancer cells to be the parasites—besides explaining at once the lawless and vicious growth of the cellular elements of cancer, and many other points of doubt, and at the same time conforming exactly with the laws—so far as we know them—which govern the successful and abiding infection of the higher animals with parasites.

It is only necessary to suppose the presence in the tissues of an animal parasite, and with it, through trauma or otherwise at the point where the parasite lies, a "locus minoris resistentiæ," to make it conceivable that in the struggle between parasite and epithelial cell for the survival of the fittest they should synchronously lose complementary, i. e., male and female, portions of their chromatin, and finally wind up the contest by fusion, and by such mutual agreement to live in harmony together produce discord of grave moment to the unfortunate individual who has been the unwitting party to the conflict.

Weissmann's "Vererbungs Theorie" agrees entirely with such a view of the growth of cancer, especially as it explains the hereditary tendency manifest in some individuals to develop cancer through greater susceptibility to parasitic invasion.

The real weak point here lies in the law of the "preservation of species." Whether it is possible for a coccidium, or a psorosperm, or a gregarina to conjugate with the differentiated cells of so highly complex an animal as man, is a question that should be relegated for answer to men whose work and training fit them to consider the matter from a judicial standpoint. It must be remembered, however, that, as Hansemann himself remarks, there is vast difference in the potentiality of an epithelial cell and that of the original ovum which gave to this highly differentiated cell its existence; so that, unless it can be clearly shown that some actual difference in the essential quality of life in the two, rendering their conjugation impossible, is at hand, there may not be so great a difference in the resistance between parasite and cell as to prohibit their union with a resultant hybrid offspring; and this would eliminate at once the difficulty at hand of fixing the true relationship which exists between the parasite and the other morphologic elements of the tumor.

THE ÆTIOLOGY OF CANCER, WITH ESPECIAL REGARD TO THE PROTOZOAN PARASITES OF CANCER.

By ALLEN J. SMITH, A. M., M. D.
Professor of Pathology in the University of Texas, Galveston, Tex.

Time has not advanced more than a single generation since the most advanced scientific medical writers were satisfied to regard among that group of formations known as tumors, a number of decidedly important neoplasms which have since, because of almost positive proof of their parasitic origin, been assigned to a separate position in the classification of pathological products. Even at the present day there are pathologists who continue to classify these two groups, the infectious granulomata and the tumors, as closely related—as they are, at least in many of their peculiarities; yet the appreciation of the ætiology in the one case and the failure of

any realization of the causation in the other constitute so decided a distinction, reaching into almost every aspect of their nature. relations, and treatment, that the more modern view can scarcely be held precipitate in thus separating processes such as tuberculosis, syphilis, leprosy, and actinomycosis from the true tumors, enlargements, of whose cause no actual knowledge is held. The impulse given to continued research in similar lines by the discovery of the nature of the infectious granulomata was early sufficient to call attention to the analogies presented by the cancerous and sarcomatous groups of tumors to this class of neoplasms; and these have been within the past several years the center of intense attention from microscopists, bent upon establishing their parasitic origin, and their recognition as members of the same class of new growths. These similarities consist especially in the histology and clinical course of the growths, the essential features of the histology of the infectious granulomata consist of a central group of epithelial-like cells surrounded by a greater or less zone of lymphoid cells, together with a variable connective tissue stroma. These may vary considerably in the individual examples, and do vary somewhat as to the relations and characteristics of the elements in the different forms of the granulomata.

It would require no great imaginative effort to regard the cancerous nodule, with its epithelial cells imbedded in a variable stroma of connective tissue, the whole surrounded by a greater or less amount of embryonal connective tissue elements in various stages of organization, as conforming to the same type as does the smaller gray tubercle. Nor on the other hand would it be difficult to regard the sarcoma as the result of a specific cause leading to the production of the lymphoid elements of the same type, the epithelioid elements being greatly in the minority and perhaps overlooked, or so altered in their characteristics as to be indistinguishable from the embryonal connective tissue cells which form the tumor. It is certainly suggestive of a difference between tubercle and cancer that the former, typifying the infectious granulomata, should reach a definite stage of degeneration, while no such necessary occurrence can be recognized in the cancers; nevertheless the well known fact of the long persistence of the fungoid variety of tubercle and the rather frequent degenerative accident in case of cancer are conversely suggestive of their similarity. These differences depend moreover largely, perhaps, upon anatomical relations with a blood supply which might easily be influenced by generally unimportant differences in structure, such as the amount and kind of stroma in each case. The fact that the epithelioid cells of cancer seem from histological appearances to be true epithelium, arising and growing from apparently normal epithelium, and that no such connection can be demonstrated in case of the epithelioid cells of the tubercle, should not seriously militate against the possible identity of genera of these formations, judgment being based rather upon the similarity of results than upon the apparent differences of origin. The peculiarities of metastasis, perhaps best seen in the miliary forms of both cancer and tubercle, add a further link to the chain of similarities between these formations.

One need not seek far for further suggestion of an infectious nature in cancer, although it must be confessed that the proof of such infecting power can not by any present means be more than probably predicated. The fact of its special prevalence in localities of greater or less restriction (Park, Medical and Surgical Reporter, February 18, 1893; Arnaudet, L'Union Méd., October 7, 1891; Med.-Surg. Bull., June, 1893; Fiessinger, Gaz. Méd. de Paris, March 5, 1893; Rev. de Med., January 10, 1893; Williams, Med. Chron., February, 1893; London Lancet, September 12, 1891, etc.) scattered here and there over the world strongly suggests that there are operative causes other than mere structural ones, and that these causes are such as operate from without the body. The corporeal distribution of primary cancers, at orifices and points of constriction of epithelial tubes, the lips, pharynx, pylorus, ileo-cecal valve, anus, cervix uteri, vulva, base of bladder, or at parts easily handled, as the mammæ or the general surface of the body, may, without great

effort, be interpreted as suggestive of the origin of the growth from abrasions and subsequent inoculation with an infectious agent—although it is quite true that a very different interpretation may be given of these facts. The hereditary influence which popularly and professionally has been so generally accorded cancerous growths, the instances of apparent infection related by medical writers (Fiessinger, *loc. cit.;* Arnaudet, *loc. cit.;* Guelliot, Jour. de Méd. et de Surg. Prat., March, 1893), the experiments of Hanau (Wien. Med. Presse, April 21 to June 9, 1890), Wehr (Annual Univ. Med. Sci., Vol. III, 1890), Moran (Amer. Med.-Surg. Bull., June, 1893), Von Langenbrex, O. Weber, Lebert, and others in transplantation of epitheliomatous formations to animals or among animals, of Nayet (La France Médical, June 16, 1893) in inducing epitheliomatous growths in animals by injecting a glycerin extract of epithelioma of man, and of Hahn, Bergman, and others (La Prat. Méd., June 30, 1891; Med. Presse and Circular, August 5, 1891; Cornil, La Semaine Méd., June 24, 1891); in grafting cancers to different parts of a cancerous patient's body, all stand in closest relation with the belief in the infectious nature of the growth—proof being, however, wanting.

The possibility of a parasitic origin of cancer, as well as of other new growths, was suggested years ago by Paget (Surgical Pathology; Brit. Med. Journal, 1887), who likened the growths produced upon trees by the stings of insects or by the deposition of the ova of insects to these tumors of animal structures.

While there have been at various times (Brault, Arch. gén. de méd., 1885; II, 586; Rappin, Comtes Rendus Soc. Biol., 1887; Scheurlen, Deut. Med. Wochensch., 1887, No. 48; Senger, Deut. Med. Wochensch., 1888, No. 14; Baumgarten, Centralbl. f. Bakteriol u. Parasitenk., 1888; Rosenthal, Zeitsch. f. Hygiene, 1888; Kubasoff, Wien. Med. Presse, 1890, No. 3; etc.) described vegetable microorganisms as the specific causes of cancer, the failure of confirmation and the discovery in several instances of the same microorganisms in noncancerous tissues have resulted in the practical abandonment of belief in a bacterial cause, although it is generally accepted that various bacteria may be present as parasitic incidents in cancer.

The apparent protozoan nature of certain bodies in epithelial formations as molluscum contagiosum, described originally by Virchow (Virchow's Archiv, Bd. 123 p. 149), and by a number of investigators since then (Rivolta, Dei parassiti vegetali, Turin, 1878; Bollinger, Virchow's Archiv, Bd. 58; Neisser, Viertelsjahrschft. f. Dermatologie, 1888, XV, 553; and others); and in Paget's disease of the nipple (Hutchinson, Trans. Lond. Pathol. Soc., 1890, 214; Darrier and Wickham, Archive de Méd. Expér., etc., 1890, I, 1 and III, 47; Ann. de Derm. et de Syph., 1 and 11; Maladie de Paget, Paris, 1890; Bowlby, Brit. Med. Journal, 1891, p. 1070; etc.) suggested moreover the likelihood of the existence of similar bodies in the allied cancerous formations; although there was no lack of opposition to the belief that the bodies seen in molluscum and subsequently in cancerous tumors were of parasitic nature.

In 1888 Pfeiffer (Zeitsch. F. Hygiene, 1888; Die Protozoan als Krankheitserreger, 1890—zweite Aufl., 1891) called attention to certain bodies he had observed in the cells of the tumor masses of two cases of general carcinosis. These he described as sporozoa, in their development resembling the microsporidia. The following year Malassez and Albarran (Comptes Rendus Soc. de Biol., 1889; Les Tumeurs de la Vessie, Paris, 1892) announced their discovery of bodies resembling coccidium oviforme in the cells of an epithelioma of the jaw. Thoma (Fortschr. der Med., June 1889) described about the same time small cell-like structures he had observed in the nuclei of the epithelial cells of glandular cancers of the rectum, breast, and stomach, bodies measuring from 4 to 15 micromillimeters in diameter, rounded or oval or somewhat of the shape of pseudonavicellæ, usually occurring in groups of five or six. The nuclei of the cells in these cases refused to stain well with hæmatoxylin and eosin, safranin, alum-carmine, and other reagents employed, and were apt to show numerous vacuoles, empty or containing the parasitic bodies or a little

granular matter. The following year Sjöbring (Fortschr. der Med., 1890, No. 11), who had been studying the processes of nuclear division in a cancer of the breast, noticed certain bodies resembling protozoa, and after careful examination decided such to be their nature. The life history which this author attributes to these bodies is briefly as follows: Small round masses of protoplasm, 2 micromillimeters in diameter, may be met with free in the tissues or within the cell protoplasm. One of these bodies, for example, penetrates the nucleus of a cell, gradually increases in size and then passes into the cell protoplasm, where it may remain for a variable time in the shape of a slightly granular mass of protoplasm surrounded by a clear zone, but without a cell wall. It may escape entirely from the cell and be found free in the tissue spaces at this period. Eventually, however, it enters an epithelial cell, becomes surrounded by a membrane and at maturity nearly fills the host cell. Small curved rods, surrounded by bright, hyaline matter, and presently becoming encapsulated, develop within the parasitic body, 20 or 30 in number, giving rise to the appearance of a sporocyst. These spore-like bodies after a time escape from the parasite and enter fresh cells to undergo the same cycle. Sjöbring was unable to demonstrate a nucleus in these bodies, and for this reason and from the various appearances presented during the history of the organisms and their evident method of reproduction by sporocyst formation, places them among the sporozoa and probably in the class of the microsporidia. The author states that he found these bodies in six out of seven cases of cancer of the breast which he had examined, and in two cancers of other parts of the body.

These descriptions of Thoma and Sjöbring found corroboration shortly in publications by Balbiani (Virchow's Archiv, Bd. 115), Hacke (Soc. de Biol., 1890), Wright (Address at Univ. of Toronto, 1890), Strobe (Beiträge zur path. Anat. u. allgem. Pathol., 1891, XI, 1), and to a certain extent in papers by Steinhaus (Virchow's Archiv, Bd. 126, and Bd. 127), Foà (Centralblatt f. Bakteriologie u. Parasitenk., Bd. XII, p. 185), Soudakewitch (Ann. de l'Instit. Pasteur, 1892, 3.), Podwyssozki and Sawtschenko (Centralbl. f. Bakteriol. u. Parasitenk., Bd. XI, p. 93), Kürsteiner (Virchow's Archiv, Bd. 130, and others). Of the more recent writers, Soudakewitch found in the cells and cell nuclei, of glandular cancers especially, small round or oval bodies, sometimes with a membrane about them. By special hardening with osmic acid and subsequent staining in hæmatoxylin these bodies may be seen surrounded by a clear or granular or rayed zone. If homogeneous they take the stain but faintly, while the granules or rays surrounding them take a deep hue. Metschnikoff, who had opportunity to examine these preparations, states in a note added to the paper that these bodies are probably coccidia, judging from the appearance of the envelope and its protoplasmic contents. Podwyssozki and Sawtschenko fail to note the parasitic bodies within the cell nucleus, but have, in the instances studied, found numerous examples in the cell body. The second of these writers, Sawtschenko (*loc. cit.; ibid.*, Bd. XII, No. 1), describes the following appearances which he was able to demonstrate in sections of a cancer of the lip in large numbers. The cell protoplasm of some of the cancer cells presented one or more vacuoles, some of which were empty and which may have been the former resting places of protozoa. In some of these vacuoles were to be seen small rounded bodies, sometimes provided with a deeply staining mass suggesting a nucleus. Often these corpuscles (within the vacuoles) had a prolongation, giving rise to a shape like that of a frog's larva—a frequently noted form.

These frog-larva bodies were of varying size, in several instances quite large and long, apparently the wandering stage of the parasite. Thus there might be seen one of these larger, worm-like bodies, passing from one epithelial cell to another, or lying between the cells. After thus penetrating an epithelial cell the parasite seems to assume slowly the rounded shape, pushing the nucleus off to one side, and presently becoming inclosed within a membrane apparently derived from itself. Occasionally several such resting forms may be witnessed lying side by side, surrounded

by a separate or by a common capsule. Gradually in this rounded, resting stage the central portion seems to stain more deeply, as if of nuclear nature, and about the margins, especially without the capsule, appear small, round, highly shining corpuscles, like spores. Presently within each of these, as they increase in size, appear deeply staining masses, single or double, rounded, oval or spindle-shaped. As these spore-like bodies develop about the margin of the parasite the capsule of the latter becomes less clear, apparently giving up its substance to the growth of the spores; and within the body of the parasite there appear a large number of similar protoplasmic masses. The whole mass is now very similar to the sporocyst stage in the development of sporozoa, save that the capsule of the cyst is wanting. What becomes of all these supposed spores is uncertain; some probably pass from the vacuolated cell and pursue their life history elsewhere in the body of the infected individual. Some at least continue to develop at the site of their formation, swelling out the host cell to its greatest capacity, pushing off the nucleus to one side, and often compressing it into an insignificant size. Constantly the marginal spores develop in advance of the central ones. Eventually each of these spores form from the nuclear-like body in its interior a frog-larva-like body, which probably then makes its way into the interior of a fresh cell, assumes the resting form, and goes through a similar cycle.

Besides these stages in the life of a seeming sporozoon Sawtschenko describes what has probably been observed by other writers and interpreted by them as examples of endogenous cell formation—small epithelial-like cells within the host cell, probably the physaliphora of Virchow. The contained cell is somewhat more granular than the protoplasm of the host, and sometimes shows a very delicate meshwork in its substance. It contains a nucleous usually staining deeply, and sometimes a nucleolus. Apparently a further stage of the same kind of body is such a contained cell with two or four crescent-shaped bodies in the interior, strongly suggestive of the pseudonavicellar stage in the life history of the sporozoa. The author is unable to indicate clearly the relationship between these and the first-described bodies which entered into the formation of the sporocysts, but the presumption is that such a relation does exist, and that the crescents in some way develop into the worm-like body of the wandering form. The strong likeness of this last, the wandering form, of the cyst form, and of the pseudonavicellar form, to the growth of sporozoa is almost convincing of the parasitic nature of these bodies. It should be recalled that a very positive difference exists between the descriptions of Sawtschenko and Podwyssozki on the one hand and of Soudakewitch on the other in that the former did not find any intranuclear forms, as did the latter and others. Foà's (Centralbl. f. Bakteriol. u. Barasitenk., Bd. XII, No. 6) descriptions are very analogous to those of the writers quoted and need not be more carefully reviewed. More recently Korotneff (Centralbl. f. Bakteriol. u. Parasitenk., Bd. XIII, No. 11, 12), describing the appearances encountered in a cancer of the lip (asserting, however, his observations of similar organisms in cancers from other positions), corroborates the statements of Soudakewitch, Podwyssozki, and Sawtschenko and a number of other investigators, but adds that he is persuaded that neither of these writers has brought forward the fully developed form of the protozoon. This fully developed stage he describes as a gregarine-like body of some length, too long to be contained in an ordinary cancer cell, having a thickened head and extended body. In the neighborhood lie, in the cancer cells, smaller, round or oval forms, younger forms, of the parasite, coarsely granular, containing nuclei, multiplying by fission and distending the host cell by pressure from a center, causing the concentric bodies of the squamous epithelioma and producing a certain amount of degeneration in the immediate vicinity. When not afforded sufficient nutriment these bodies fail to develop, become encysted and are decidedly coccidiform in appearance. In the interior of these develop bodies called "zooids" by the author, which, escaping from the coccidiform bodies pass into other cells and go through the regular gregarinoid cycle. Besides these ordinary zooids

what the author terms "sporozooids," falciform bodies, are also to be found, composed of a granular mass of protoplasm surrounded by a hyaline wall. Such a body, after escaping from the host cell, fastens itself (the protoplasmic portion at least) to the surface of a new epithelial cell, thrusting out projections like those of an amœba; others of the same kind are to be found in the tissues about the epithelial part of the tumor.

Ruffer and Walker (Brit. Med. Jour., 1892, Vol. II, p. 113; Jour. of Pathol. and Bacteriol., October, 1892), who in England have followed up the work upon the cancer protozoa, and who at first were unable to demonstrate the intranuclear form of the parasite, fully confirm the work of the continental workers, in that the former, about the close of the past year (Brit. Med. Jour., November 5, 1892) announced his discovery of this variety, and adds that he "has seen every stage in the life history of the protozoon of cancer, from the time when the parasite appears as a spore in the nucleus to the time when it leaves the latter as a young, fully formed parasite." Galloway (London Lancet, No. 5, 1893) has recently affirmed his belief before the Royal College of Surgeons in the protozoan nature of the various bodies described, on account of their apparently organized structure, their distinctive staining reactions, and their analogy to well-known protozoa. Kürsteiner (Virchow's Archiv, Bd. 130), has announced that he has found bodies corresponding to the descriptions of the above-named writers in a papilloma of the bladder and in papillary adenomata of the uterus.

Not all of the investigations into the questions of the existence of animal parasites in cancer, however, have been productive of favorable comments from their authors. There are those who have denied totally the parasitic character of the appearances described by the authors quoted, and who would explain the phenomena mentioned entirely upon the ground of cellular degenerative changes or of changes induced by faulty or special methods of technique. There are, too, those who, while acknowledging the similarity of the bodies to sporozoa, deny that sufficient evidence has been adduced to warrant a belief in their parasitic nature. Thus Van Heukelom (Centralbl. f. pathol. Anatomie, 1890, p. 704), from a study of over two hundred tumors, while able to find the bodies in question, was of the opinion that their smaller forms might easily be explained by the idea of cell degeneration—that they were perhaps leucocytes with fragmented nuclei. The larger bodies might, perhaps, be epithelial cells of peculiar shape, although he did not believe them to be necessarily degenerated cells. Borral (Arch. de méd. expérim. et d'anatom. pathol., II, p. 786, 1889), preceding the latter writer, also mentions the two groups, the small intracellular bodies and the large forms of the supposed parasites. The former, the younger, the coccidian forms of those favoring the idea of parasitism, he would regard as examples of endogenous cell formation; and the second, the forms corresponding to the sporocyst stage of the parasites, he believes to be derived from the tissue elements of the cancer by some peculiar cellular degeneration. So, too, Firket (Centralbl. f. allgemein. Pathol. u. pathol. Anatomie, 1890, No. 20) objects to the belief in the protozoan nature of these bodies because he has seen similar appearances in the epithelium of the skin covering a fibroma, where no evidences of cancer were present. He believes that from pressure by the tumor these bodies had been produced through degenerative changes.

The idea of cellular degeneration as explanatory of these various appearances is also sustained by Schütz (Mikroskopische Carcinombefunde, Frankfurt, 1890; Münch. med. Wohensch., 1890, No. 35), Torok and Tommasoli (Monatsh. f. Dermatol., 1890, No. 4), Klebs (Deutsch. med. Wochensch., 1890, Nos. 24, 25, 32), Delepine (British Medical Journal, September 9, 1872); Duplay and Cazin (Seventh Congress of Hygiene and Demography), Cazin (Arch. gén. de Med., January, 1892), Duplay (Gaz. des. Hopiteaux, 1893, p. 210); Ribbert (Deutsch. med. Wochensch., 1891, p. 1179), and recently by Gibbes (Amer. Jour. of Med. Sci., July, 1893. The last-named investigator has contributed a valuable addition to the literature antagonistic to the

parasitic theory of cancer. Believing it impossible to prove the various so-called parasitic bodies to be distinct elements of protozoan nature at the present time by any but staining methods, he sought to find some differentiating reagent capable of distinguishing the supposed parasites from the tissue cells of the animal body. Employing the well-known coccidium oviforme from the liver of a diseased rabbit as the control, he produced a test-stain,* giving the parasites the desired difference of hue from that given the epithelial cells of the organ when the tissue had been hardened by the ordinary alcohol method. In sections of various cancerous growths hardened in the same manner and stained by this method, Gibbes was unable to demonstrate the parasites, although after hardening the same tissues in bichloride of mercury solution, Muller's fluid, and in several other solutions, the appearance of protozoan bodies were easily appreciable. He concludes from this that the supposed prozoa of cancer are no more than the results of faulty methods of hardening. Further study and confirmation of these results of Gibbes are exceedingly desirable at this stage of our knowledge, although it is of course possible that even the failure to take a stain except under conditions of previous hardening by special reagents may be due to peculiarities inherent to the supposed microorganisms. Cornil (Jour. de l'anatom, et de physiol., 1891, No. 1), Hausemann (Virchow's Archiv, Bd. 123) and others hold forth the possibility of mistaking various stages of cellular division for these supposed sporozoa. Ströbe (Ziegler's Beiträge, 1891, xi), and Steinhaus (Centralbl. f. allgem. Pathol., 1891, No. 2), admit that some of the bodies to be found in the cancer cells are extremely suggestive of protozoa and are inclined to believe that in some cases, at least, are real protozoa, but do not accept for that reason the belief that they are an ætiological factor of the tumors. Steinhaus, in a second paper (Virchow's Archiv, Bd. 127), distinctly denies the protozoan nature of the bodies described in the center of the "pearls" of squamous epithlioma, attributing them to cellular changes; and in the same journal Virchow adds a note reiterating his original views of the endogenous formation of these bodies and their want of ætiological significance.

Besides the supposed animal parasites which have attracted attention, Russell has recently (British Medical Journal, December 13, 1890) described as the real cause of cancer a body which he believes to belong to the fungi. This body, because of its affinity for acid fuchsin, he speaks of as the "fuchsin body," and states that it may be found, with but few exceptions, in cancer, and in no other structures. These fuchsin bodies occur in groups of two three, four, or more, generally have a clear space about them, and are bounded by a cansule, are spherical in shape, measure from 4 to 12 micromillimeters in diameter, and are homogeneous and structureless in appearance. Russell states that they appear to grow by gemmation, and are found in the rapidly-growing parts of the tumor. Numerous writers, however, have shown that these bodies are by no means characteristic of cancer, and less attention is at present paid the claims of the last-named investigator than those of the writers above mentioned (Ballance and Shattock, British Medical Journal, 1891; Dean, London Lancet, April 6, 1891; Duplay and Gazin, *loc. cit.*; Rennie, Austral. Med. Gaz., March, April, May, 1893, etc.).

Attracted by the evident sincerity of the writers describing the various suspected parasites in cancerous tissues, as well as influenced by a long-existing faith in the eventual discovery of some such parasitic cause for carcinomatous and sarcomatous tumors, the writer was lead to carry on a series of examinations in the same line, with the purpose of confirming or denying the views already advanced. From the results of these observations it is not possible to definitely assert or deny the cor-

* The stain is thus made: Dissolve 2 c. c. aniline oil in 10 c. c. rectified spirits; add enough distilled water to make 100 c. c.; filter; add 2 grams rosanilin sulphate; label No. 1. Stain No. 2 is a 1 per cent solution of iodine green. Leave sections in stain No. 1 for 10 minutes, wash in water, then in alcohol; place them next in stain No. 2 until a dull purple is assumed. Wash thoroughly in water dehydrate in alcohol, clear in cloves, mount in xylol-balsam.

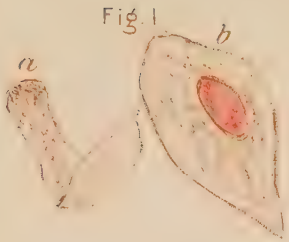
rectness of the views of the older observers, however, and they may only be offered as additions to a growing study. The general impression, however, gained from these examinations is not unfavorable to the belief in the presence of protozoa in cancers, and has only added to the confidence of the writer in the ultimate success of those seeking to demonstrate the general features of the protozoan theory of cancer causation.

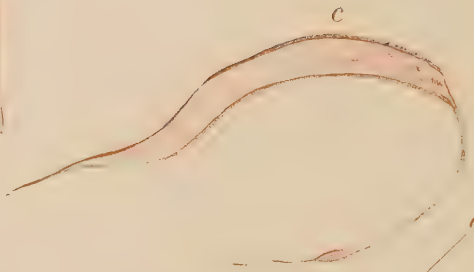
It is scarcely likely that all the appearances described as parasites will bear the test of continued observation, and it is just as improbable that the full list of these organisms has thus far been announced. From the writer's experience he is led to regard most of the minute, intranuclear bodies, the rhizopod-like inclosures in the pearls of squamous epithelioma, the amœboid bodies of Korotneff, as well as the fuchsin bodies of Russell, as being of cellular origin, degenerative in nature. The larger, intracellular and extracellular bodies, the various appearances of sporocyst formations, the peculiar double-contoured coccidiform bodies, the gregarine-like bodies, the bodies containing falciform and pseudonavicella-like corpuscles, and the bodies in the so-called physaliphora, evidently belong to a different class; yet the proof of their veritable protozoan nature is not established.

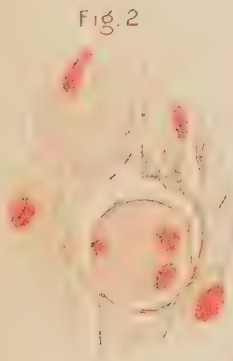
The various forms of these parasites encountered by the writer bear the greatest similarity to the bodies described by Podwyssozki, Sawtschenko and Korotneff; and it seems probable that the last named observer is correct in his statement that if they be protozoa these bodies should be classed (at least some of them) among the gregarinidæ. It seems quite likely, however, that there exist several varieties, some of which are coccidia, and others perhaps rhizopods. Thus the specimen presented in figure 8 can scarcely be otherwise interpreted than as a rhizopod in the process of gemmation; and it is possible that some of the amœboid bodies of Korotneff may belong to the same group (if they really exist as parasites). To the more important question as to their nature, are they really independent organisms, are they parasitic bodies? There is but one argument to be offered in answer, the analogies they present to known stages of the life-history of recognized species of protozoa. On the other hand there are grave reasons for doubt, the evident mistakes of a number of writers in relation to some of the forms described, the failure of such stains as that of Gibbes to differentiate these bodies from the cells of the structure in ordinarily prepared tissues, and the long list of acknowledged possibilities of mistake. Nevertheless the similarities to known protozoa are sufficiently strong to make one disposed to accept some of these corpuscles as independent beings, possibly the causative factor of the tumor in which they occur.

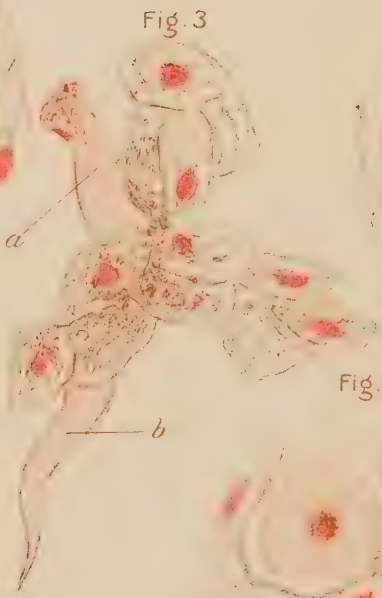
Twelve growths were examined, all hardened by the ordinary alcohol methods or entirely in absolute alcohol. Of these, 3 were epitheliomata of the lip, 2 of the penis, 1 of an inguinal gland secondary to an epithelioma of the vulva, 1 a fungating epithelioma of the breast, 2 glandular cancers of the breast, 1 a cancer of the uterus, 1 a cancer of the testicle, and 1 a cancer of the prostate. These tumors were stained either with haematoxylon, haematoxylon and eosine, borax-carmine, alum-carmine, or safranine. Of these the specimens stained with haematoxylon and those with safranine presented the most easily recognized and most numerous examples of the supposed parasitic bodies. It may have been from faults of preparation, especially of hardening and fixation, that these bodies in the specimens examined were less numerous than one would imagine from perusal of the writings of the continental investigators. Foa, it is true, has called attention to the fact that one should not expect to find swarms of protozoa in every portion of a specimen, and states distinctly that he succeeded only in a limited number of specimens and only in isolated portions of the preparations. The writer has met with the same experience. Although in most specimens there are numbers of appearances which future study may perhaps show to be parasites, yet fairly suggestive and convincing examples are by no means found in great numbers and often require prolonged search in well-prepared specimens.

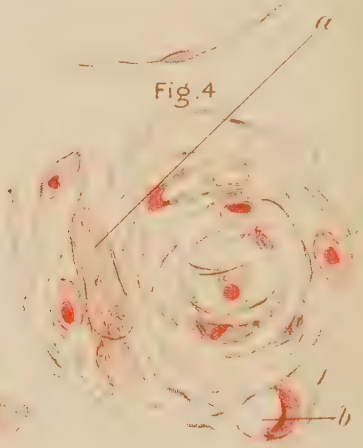
Fig.9
Fig.10
Fig.11
Fig.13
Fig.14
Fig.15
Fig.7

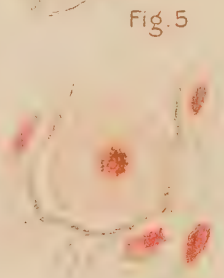


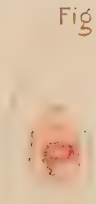


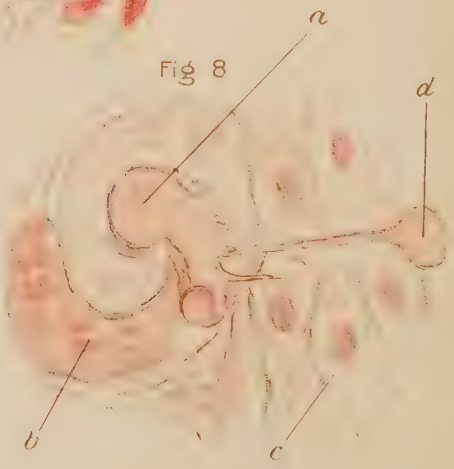












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Of these twelve specimens, in three, a cancer of the breast, a cancer of the prostate, and an epithelioma of the penis, the sought-for bodies were not found; and of the remainder, the individual specimens varied considerably in their relative frequence of exhibition of the so-called parasites. The most commonly observed variety of these phenomena was that of a single intracellular, round or oval mass, sometimes distinctly contained in a space (fig. 7), again completely filling (fig. 10) the vacuole in which it occurred. Such a mass usually measured from 8 to 15, 20 or more micromillimeters in diameter, was more or less granular, and sometimes contained (fig. 10) a large number of deeply staining, round, oval, or falciform "clumps." At times the greater portion of the epithelial cell was occupied by such a body, which generally was stained slightly more or less deeply than the protoplasm of the cell. These differences in the intensity of coloration probably depend in a measure upon the age of the parasite, the older specimens taking the stain less readily than the more actively developing bodies. The protoplasm of such a body is generally somewhat more granular and refractive than that of the host-cell. Occasionally, instead of these intracellular bodies being single, there may be found a large group in one cell. Similar bodies are to be found between the cells of the tumor in the lymph spaces, and occasionally in the structures away from the epithelial portions of the cancer. The large numbers of hollow cells (fig. 4), with their nuclei flattened out and pushed to one side by pressure, so as to create the "seal-ring" appearance, are often, doubtless, to be regarded as the former resting places of these intracellular bodies, the granular detritus often to be seen in these vacuoles being probably the remains of degenerated parasites. In but one or two instances (fig. 7) were the cell-like bodies interpreted as examples of endogenous cell formation by certain writers encountered. From our present views of cellular origin it seems unlikely that such an interpretation can be entertained, and from negative evidence at least, one can assert their probable parasitic nature. Sawtschenko, in his description of the sporocysts to be seen in cancerous formations, states that these arise from the intracellular bodies, in which he recognizes the frequent presence of a nuclear body. This was not, however, observed in the cases examined by the writer. The intracellular bodies, save those last described, were nonnucleated, and in no instance was there a cyst formation observed within the cellular limits (unless the occasional occurrence of a group of intracellular bodies, as above described, be regarded as examples of sporocyst formation). Excellent examples of sporocysts (fig. 9) were found a number of times, in all of which there could be easily shown a distinct membranous-like wall to the cyst. The spore-like bodies within these cysts were very like the intracellular bodies in structure and in coloration, but differed in the individual cysts as to whether there could be found the small, deeply staining interior masses. These deeply staining contents, usually few in number, from their frequent arrangement in pairs, are suggestive of active reproduction by fission, and are probably the germinal portions of the containing body (fig. 17).

In none of the specimens examined, probably on account of the intensity of the staining, could a structure be recognized in these contained masses, which look much like drops of some hyaline deeply-stained substance. The claim that these clumps are masses of chromatine is not to be gainsaid, but the fact that they have a decidedly deeper hue than the small chromatine masses in the epithelial nuclei somewhat sustains the belief that they are not of cellular origin. Within the sporocysts the spore bodies are found, 10, 20, 30, 40, or more, in a mass, like minute hydatids (fig. 9). They are faintly granular, quite variable in size, round, flattened and spindle-like in shape, the differences probably depending upon circumstances of pressure within the cyst. The wall about these bodies is distinct and clearly cut on the inner surface, and is apparently reinforced on the outside by adjacent flattened cells of the tumor, and by an occasional bit of connective tissue. It will be recalled that in the descriptions of Podwyssozki and Sawtschenko the intracellular sporocysts showed the spore formation as an exogenous production at first, the spores devel-

oping in size so that the larger were constantly seen on the borders of the mass, the capsule of which early disappeared from view. It is possible that the writer has failed to recognize these cyst formations until they had developed to such a stage that the epithelial host-cell had been entirely absorbed along with the original cyst membrane; yet in that event it seems quite as singular that the very clear cyst-wall observable in some of the specimens examined should have been undescribed by these authors. Rather would it appear that two distinct appearances have been noticed, and further study will be required to indicate their relation.

Besides the intracellular bodies and the sporocysts, the gregarine-like body (figs. 1, 3, 4, 11) was one of the most readily recognizable appearances when present. It was observed in 3 of the specimens examined, an epithelioma of the lip stained with safranin, an epithelioma of the penis stained with borax carmine, and a fungating epithelioma of the breast stained with haematoxylon. This body, not recognized by any of the writers quoted, save Sawtschenko and Korotneff, is spoken of by the latter as the *rhopalocephalus* of cancer, from the thickened anterior extremity. This form of the supposed parasite is an elongated worm-like body, varying in the instances studied, from about 20 micromillimeters to double that length. The anterior end is rounded, not as thickened as Korotneff describes in his specimens, and usually contains a small amount of granular matter and a few masses of a deeply staining substance. The individuals observed in the epithelioma of the penis had a head not unlike that of a minute tape-worm, the opposite end terminating in a rather blunt point (fig. 1). The interior of these bodies was structureless, granular anteriorly, hyaline about the borders and toward the posterior extremity. No nucleus was observed in any of these. It might doubtless be objected that these gregarine-like forms are but peculiarly shaped epithelial cells devoid of a nucleus, and perhaps slightly altered in their constitution, this alteration having caused them to have taken on the staining reagent in the slightly different degree observed. This may be true; but the frequent occurrence of the described shapes and the occurrence of such an apparent conjugation as shown in figure 8, lead one to considerable confidence in their parasitic nature. So, too, one can not definitely say that the appearances presented by the sporocysts and their contents are not due to some cellular change, a number of cells in one locality undergoing contemporaneously alteration to the production of a material similar to hyaline substance; yet in this case it is scarcely likely that the contents of the spore bodies should be so arranged as to suggest multiplication rather than fragmentation, or that such falciform and spindle-shaped masses (suggestive of the pseudonavicella stage in the development of the gregarines) should be assumed by degenerating elements. The same argument must be presented in case of the ordinary intracellular body.

In but a single instance has the writer been satisfied to accept any of the bodies observed as showing the double contour of the true coccidia; and never has there appeared to him any suggestion of the segmentation as described so clearly by Korotneff, Foa, and others. The failure of these forms, however, as well as of the intranuclear bodies, may depend on differences in the technique of preparation. It is not necessary, however, to accept these to fill out the probable life-history of this supposed parasite, which the author is disposed to class among the gregarines. If this conjecture be correct, it is interesting to note that the gregarine of cancer is the first gregarine parasite of man, if not of the vertebrates generally. Frequently found in the invertebrates, the gregarines have, in vertebrate parasitism, given place to the coccidia and perhaps the micro and myxosporidia.

The fully-developed parasite, for which Korotneff's term "rhopalocephalus carcinomatosus," may be tentatively accepted for want of a better, after a variable period of wandering, probably takes a permanent position between the epithelial cells (or perhaps within a cell, whose substance then forms the wall of the cyst) and gradually contracts to assume the round or resting form (figs. 2, 5). It is probable that before the assumption of this spherical shape, conjugation (fig. 4) takes place,

the occasional discovery of several such round bodies within a common capsule (as noted by Sawtschenko) being in evidence of the verity of such a supposition. It is not impossible that the contained cells in the physaliphora, above described, may represent the intracellular occurrence of this resting stage of the developed parasite. From the protoplasm of this rounded body, within its substance, are next formed small, round, or oval refractive, hyaloid masses which grow rapidly and distend the wall of the host-cell or the wall formed about the parasite lying between the cells; thus is given the characteristic appearance of the sporocyst stage. These small masses or spores continuing to grow apace, within them appear the active germinants, the pseudonavicellæ of this gregarine, the round, oval, spindle or crescent-shaped, deeply staining "clumps." Either before or after the appearance of these last, the cyst-wall of the sporocyst may have ruptured from distension by the increasing size of the spores; and the latter then pass away as free bodies to enter new cells or continue within the lymph-spaces. Many of these, if one may infer from the large number of empty vacuoles and vacuoles containing granular débris in the cancer cells, perish or remain indifferent for an indefinite time. But from a few the germinal masses probably develop by direct or perhaps by indirect, and at present unknown stages, to the fully-developed gregarine, then to undergo the same cycle.

The writer is indisposed to accept Korotneff's amæboid stage, which is logically correct, it is true, but which, if the similar appearances seen in the specimens examined by the writer (fig. 15) are identical, are almost surely the result of protoplasmic change and contraction. So, too, the small, intranuclear bodies should not be unhesitatingly accepted. They may be of protozoan nature, yet the very great possibility of mistaking mitotic figures or masses of altered chromatin, and the absence of necessity for their presence in the life scheme of the parasite, have seemed to be sufficient reasons for their rejection for the present.

Among the cells, and occasionally within the cells, stained by eosin, an acid aniline dye, may be found numerous bodies which, from their shape, size, appearance, and position, the writer suspects are identical with the fuchsine bodies of Russell. If this supposition be true, the writer must deny the parasitic nature of these fuchsine bodies. Entire cells, conforming exactly to their original shape, may here and there be seen, having the same peculiarity of coloration and evidently composed of the same matter. The nature of the change is apparently a hyaline degeneration; and such a view is in strict confirmatory relation with the opinions published by several English and continental investigators into the nature of Russell's parasites.

Whatever else has been said, however, in relation to the subject, these two facts stand out in bold relief, and these may be offered as the writer's conclusions: (1) Cancer presents a course and clinical aspect analogous to those of formations of parasitic origin; (2) within cancerous tissues occur bodies which closely resemble the different life stages of protozoa, of sporozoa, of gregarinidæ.

That further study is necessary goes without saying, and that such study may be of the greatest value it should be of the most extended character, both as to the methods of study and the tissues studied. New methods of staining, efforts at differentiation under all conditions of previous preparation of the tumors, the examination of tumors from all parts of the body and from individuals all over the world, the examination of tumors other than the strictly cancerous and of normal structures—all this is demanded, as well as the pursuit of the great desideratum, a culture method for the purpose of the growth and isolation of the protozoan parasites, if the subject is to be conclusively decided.

EXPLANATION OF PLATE.

FIG. 1.—*a*, gregarine form of parasite; *b*, epithelial cell; *c*, gregarine form of parasite, with apparent flagellum. From epithelioma of penis, stained with borax carmine; $\frac{1}{12}$-inch hom. oil immersion lens; ocular 4; Zeiss.

FIG. 2.—Hyaline body lying among epithelial cells in a spore; staining slightly deeper than cells. Possibly the resting form of the gregarine. Same specimen and same amplification.

FIG. 3.—Gregarine form of parasite lying among a group of epithelial cells. *a*, apparently head; *b*, tail. It could not, however, be told surely if *a* and *b* are continuous, the cells and granular matter covering the central part of the supposed body.

FIG. 4.—Concentric body from epithelioma of lip, stained with safranine. *a*, gregarine form apparently in conjugation; *b*, vacuolated cell.

FIG. 5.—Same as fig. 2.

FIGS. 6 and 7.—Epithelial cells from epithelioma in an inguinal gland, secondary to epithelioma of vulva; stained with safranine. Fig. 6, with a small body in nucleus; fig. 7, with rounded hyaline, body in vacuole.

FIG. 8.—Group of cells from epithelioma of lip, stained with safranine. *a*, a rhizopod-like body, apparently giving origin by germination to a new body, *a'*; *b*, possibly a second similar body; *c*, epithelium.

FIG. 9.—Sporocyst lying between epithelial cells in testicular cancer, stained with hæmatoxylon and faintly counterstained with eosin. *a*, deeply stained, probably relatively young spore bodies; *b*, epithelium; *c*, red blood cells introduced for comparison of size and hue with spore bodies.

FIG. 10.—Same specimen. Intracellular body, with deeply staining interior masses (possibly pseudonavicellæ).

FIG. 11.—From an epithelioma of breast, stained with hæmatoxylon and lightly counterstained with eosin; *a*, spore bodies lying free in spaces among cells of tumor (probably after escaping from spore cyst); *b*, gregarine form.

FIG. 12.—Same specimen. Cells containing possible pseudonavicellæ.

FIGS. 13 and 14.—Same specimen. Spore-like bodies apparently within remnants of epithelial cells, and containing pseudonavicella-like masses.

FIG. 15. Appearance simulating Korotneff's amœba form, apparently due to vacuolation and destruction or contraction of protoplasm of epithelial cell.

FIG. 16. Epithelial cell, containing two small spore-like bodies in vacuole.

FIG. 17. Ruptured sporocyst, showing escape of spore bodies, apparently older than in fig. 9, and therefore less deep in hue, and containing numerous pseudonavicella-like bodies.

THE EPITHELIO-GENETIC ORIGIN OF CARCINOMA.

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The title which I have chosen for this paper is probably a bad one, in that it is ambiguous, and may be construed to mean a discussion of the old question, Does carcinoma arise from epithelium alone, or can it also originate from the connective tissues? All pathologists now adhere to the former view, so that a further discussion would be useless. The title intends to convey the idea that carcinoma arises from epithelium by abnormal growth of that tissue, without any parasitic influence, in which sense the carcinoma is epithelio-genetic, not protozoo-genetic. The parasitic theory of carcinoma is not new, yet it is far from old, and the majority of the members of this congress have seen its development as the science of bacteriology developed, watched its acme under the feverish enthusiasm of Scheuerlen (Deutsche med. Wochenschrift, 1887, No. 48), Schill (Deutsche med. Wochenschrift, 1887, XIII, 1034), and Kubassoff (Wiener med. Presse, 1890, XXXI, 1145), and marked its rapid defervescence under the radical treatment of Senger (Deutsche med. Wochenschrift, 1888, XIV, 234), Baumgarten (Centralb. f. Bakt. u. Parasiteuk, 1888, III, 397), and Rosenthal (Zeitschrift f. Hyg., 1888, V, 161). A year passed quietly by; then the theory suffered a relapse in a somewhat modified form at the hands of Malassez (C. R. de la Société de Biol., Paris, 1889, Mar. 23), Albarran (*ibid.*, 1889, 9 s., I, 265), Darier (*ibid.*, p. 294), and many others, who inform us that carcinoma is a parasitic disease, but that it is produced by animal parasites closely related to the coccidia of the rabbit.

The discussion of this new theory of the etiology of carcinoma naturally divides itself into two principal parts: I. Are animal parasites present in carcinoma? II. If present, are they of etiological significance?

I. ARE ANIMAL PARASITES PRESENT IN CARCINOMA?

To do justice to this very important question, it seemed necessary to combine a careful review of the literature with my own researches upon the subject, but the prosecution of this idea gave birth to so voluminous a manuscript that all hope of embodying it here was given up, and it was separately published (University Medical Magazine, September, 1893).

Given very briefly, the history of these animal parasites is as follows: The *coccidium oviforme* had long been known to infest the liver of the rabbit. Malassez (*loc. cit.*) observed similar bodies in the epithelium in Paget's disease; Thoma (Fortschritte der med., 1889, VII, 413) found similar bodies in carcinoma, and these observations were elaborated by Sjöbring (Fortschritte der med., 1890, VIII, 529), Toå (Centralb. f. Bakt. u. Parasiteuk, vol. II, No. 6, 1892), Podwyssozki (Centralb. f Bakt. u. Parasiteuk, 1892, XI, No. 16, 17), Sawtscheuko (*ibid.*, 1892, XII, No. 1), Soudakewitch (Ann. de l'Institut Pasteur, 1892, VI, 145, 545), Ruffer and Walker (Journal of Pathology and Bacteriology, 1892, I, No. 2), and others, and the described bodies finally pronounced to be protozoa and the cause of carcinoma.

My own observations coincide with those of the preceding investigators in the discovery of the bodies in question, some of which were found in nearly every one of the 40 carcinomata which I studied

The bodies called parasites I generally found in the epithelial cells, in one instance in the nucleus, but in all others in the protoplasm. They are spherical or slightly oval in shape, smooth in outline, not infrequently seeming to be surrounded by a double capsule. Sometimes they are homogeneous, sometimes homogeneous containing a more or less distinct nucleus, sometimes are granular throughout. The size varies from an almost imperceptibly small sphere to one so large as to distend the cell and compromise the shape of the nucleus by the pressure exerted. The majority are very uniform, however, being about 2–2½ times the size of the nuclei of the epithelial cells. The separation between the inclosed body and the protoplasm is always sharp, and sometimes a space exists between the surface of the inclosure and the cavity in the protoplasm as if the foreign body occupied a vacuole. When nuclei are present, they are a trifle indistinct in outline, sometimes appearing simply as a collection of granules near the center of an otherwise homogeneous body. Occasionally forms were found in which the granules arranged themselves in a cruciform figure; again others in which, instead of the crosses and asters being made up of granules, they were caused by the absence of granules which had collected elsewhere in the cell. In none of the bodies were radiations observed.

Methods of straining, upon which so much emphasis has been placed, seem to be variable and unreliable in action. The best results were secured with hematoxylon and eosin, the granules and nuclei taking on a bluish tinge, while the homogeneous material tinges very slightly with the eosin. Biondi's method is less constant, and in my hands less clear in its action, and after a few trials I rejected it.

The best results very naturally accrue from the best methods of preservation, probably for no other reason than that the cells are all better preserved. The bodies, however, are distinctly visible in specimens preserved in Müller's fluid, alcohol, or other common preservatives.

The epithelial cells occupied by these bodies are not normal in other respects, but generally have distorted, shrunken nuclei, and often a vacuolated protoplasm. Walker and Plimmer (Journal of Pathology and Bacteriology, 1893, Vol. I, No. 4), who see these bodies originate in the nuclei, escape into the protoplasm and develop there, also see great regenerative powers in the nuclei, which rapidly heal and appear normal. My observations differ from this.

Upon the appearances presented by these bodies observers are nearly all in accord, but the inferences drawn from these data differ most widely.

What are these seemingly cellular entities so common in cancer cells? Our judgment upon this matter can not be too conservative, and in forming it, we must clearly understand the reasons given for regarding these bodies as parasites. The first is a diagnosis by exclusion. If these bodies are not parasites, what are they? To answer this in the affirmative is by no means a necessary sequence, for there are many things of which we are ignorant, perhaps more in pathology than elsewhere, and not to know what these things are does not make them parasites.

The second argument is the supposed homology between these so-called parasites and the coccidiosis of the rabbit. Now, when this homology is submitted to a careful analysis, it proves to be no homology at all. It is not morphological, for between these spherical homogeneous cellular inclosures and the large oval coccidium oviforme there is not a particle of resemblance. It is not developmental, for we know of the coccidium oviforme that when it is removed from the body and subjected to proper temperature and moisture the oval cells, divide into four smaller cells, each of which contains delicate falciforme embryos, and that these when taken into the body in food or water, protected by the surrounding capsule pass through stomach and escape into the intestine where the capsule dissolves and allows the amoeboid embryos to enter the intestinal and biliary epithelium. Of the organisms claimed for cancer, no such cycle has been seen. Neither should it be pathological, for the changes in the liver produced by the coccidium oviforme are in no way similar to cancer. The lesion produced by the former seems entirely the result of a chronic inflammation of the bile ducts, and the irregular epithelial growth that results is more like the harmless tumor known as *ajeno-cystoma papilliferum*, than it is like cancer. In the absence of any real morphological, developmental, and pathological resemblances between these cellular inclosures and the coccidia, we find the absence of all scientific grounds for the assumption that we are dealing with positive independent animal bodies.

The arguments against the parasitic nature of the inclosures is, however, much more weighty for no one has succeeded in finding similar bodies elsewhere than in cancer cells; no one has succeeded in growing them outside their customary environment, or observing their growth in that environment. They do not reproduce themselves when inoculated into animals, nor do they in any way exhibit any manifestations whatever that could not be otherwise accounted for.

But if they are not parasites what are they? Every investigator who describes these bodies is careful to tell us how to distinguish between them and leucocytes, hence sees a distinct resemblance between them. The distinguishing feature given for this differentiation is almost invariably some staining reaction, and no less reliable method could be employed, for we all know how the health or degeneration of a cell causes its staining capacity to vary. My belief is that instead of parasitic animal forms we have to deal with a variety of things, of which leucocytes are among the most important. We all know how common leucocytes are in cancer, and all of us have perceived leucocytes (sometimes numbers of them) within the epithelial cells. If there be any truth in the doctrine of phagocytosis, it is natural that one or the other cell will suffer from this relationship. That epithelial cells are phagocytic can scarcely be doubted by those who have examined cases of brown induration of the lungs or catarrhal pneumonia. If the epithelial cells of carcinoma are phagocytic it is natural that the smaller leucocytes shall be digested, and if this takes place, what a variety of appearances partially digested leucocytes shall present we can scarcely guess.

I believe that many of these so-called parasites are nothing more than partially digested leucocytes. Others of the homogeneous type I conceive to be the result of the globular hyaline degeneration, while still others, together with what some have described as "empty capsules," must be regarded as simple vacuoles.

But, and this is the exception which makes a second part of this paper necessary, there have been described by Soudakewitch and Pfeiffer (Die Protozoa als Krankheitserreger) certain forms so unlike the bodies which we have had under consideration, so unlike anything belonging to the body, so much like the *gregarinæ*, so peculiar in their radiate structure and seemingly amoeboid powers, that we can not but admit the possibility of the very rare occurrence of true protozoa in carcinoma. These bodies are large, and seem as frequently to lie between the cells as within them, and while even of these exceedingly rare forms nothing has been proven, yet their homologies of form are sufficient guarantee for our considering them true animal forms, if for no purpose other than to stimulate a study of their etiological importance.

II. IF ANIMAL PARASITES ARE PRESENT IN CARCINOMA, ARE THEY OF ETIOLOGICAL SIGNIFICANCE?

This question includes a second question of great importance—is cancer an infectious disease? Much has been written upon this subject, and an attempt to refute each argument advanced would consume so much time and space that I shall advance but three topics for discussion under this head.

a. Cancer can not be transmitted from individual to individual by inoculation.

This is the most forcible argument which can be advanced against the micro-organismal nature of the disease.

In 1840, Langenbeck (Schmidt's Jahrbücher, vol. 25, p. 104) made a mixture of carcinomatous tissue and dog's serum and injected it into the vein of a dog. This dog subsequently developed carcinomatous nodules in the lung. This experiment seems like a brilliant success but Virchaw (Krankhaften Geschivülste, bd. 1. p. 87) tells us that he examined the microscopic specimens of these tumors and found "more the appearances of that form of spontaneous cancer which I have myself found in dogs, than that of cancer elements as found in men." From this we may conclude that much doubt must be placed upon the results of Langenbeck's work.

Alibert, it is said, inoculated himself and his pupils with cancer juices but produced no cancers.

Follin and Lebert (Traité practique des malades cancerenses, Paris, 1851), after fourteen days, found distinct cancer formations in the heart and liver of a dog into whose jugular vein juices from a mammary carcinoma had been injected. The experiment is of little value because no microscopical examinations of the supposed cancerous tissue was made.

Goujon (Jour. de Anat. et de Phys., 1867) operated upon dogs, and was successful in the production of nodular formations where carcinomatous tissue had been inoculated. The microscope was not used to confirm the appearances.

Shattock and Ballance (Trans. Path. Soc. of Lond., 1887, Vol. XXXVIII, p. 412) in a paper upon "cultivation experiments with new growths and normal tissues, together with remarks on the parasitic theory of cancer," report numerous cultivation experiments with cancerous tissues, all of which were negative.

Wehr (Verhandl. d. deutsche gesellschaft f. chirurgie, 1888, vol. 18, pt. 2, p. 86) inoculated 26 dogs with fragments of 5 vaginal carcinamata and 2 carcinamata of the penis. The dogs were killed in 3–4 weeks, and in some of them distinct and large carcinoma nodules were found. It is not improbable that these nodules were fibrous rather than carcinomatous. No microscopical examination of them was ever made.

Hahn (Berlin. klin. Wochenschrift, 1888) transplanted carcinoma nodules excised from cancer patients to remote areas in the same individual, and found that the grafts increased in size and invaded the surrounding tissue. This, however, is no more than an artificial metastasis.

Senger (Berlin. klin. Wochenschrift, 1888) failed in all his attempts to produce cancer by inoculation.

Hanau (Verhandl. d. gesellschaft f. chirurgie, 1889, vol. 18, pt. 2, p. 176) made his inoculations from one animal to another of the same species. Selecting a vaginal epithelioma occurring in a white rat, he introduced fragments into the tunica vaginalis testis of two old white rats. The first rat died after seven weeks with disseminated peritoneal carcinoma. The second was killed in eight weeks and was found to have but two tumors, one the size of a pea at the tail of the epididymis, the other very small at the guburnaculum Hunteri. A third rat was inoculated from the second, and when killed three months after, was found to have a widespread carcinosis. Hanau thinks the failure of the other experimenters due to the

miscellaneous selection of animals used, and insists that the inoculations should always be from animal to animal of the same species.

Klebs (Deutsche med. Wochenschrift, 1890, Vol. XVI, p. 709) wrote a thorough paper upon the various cancer inoculations, reporting many experiments upon rats, in all of which he failed to produce a single tumor. The fragments of tissue introduced were found to be absorbed, no other change than hyaline degeneration being observed in them.

Cornil (Séance de l' acad. de méd. Par. 1891, June 23) in numerous experiments failed to produce cancer by inoculation.

Frank (Deutsche med. Wochenschrift, 1891, No. 30) also failed to produce cancer by inoculation into animals.

Shattock and Ballance (Proc. Royal Soc. of London, 1891, p. 392, and Med. Press and Circ., Lond., 1891, September 9) again enter the field and in two papers report a lengthy and comprehensive study of cancer inoculations, in which 8 monkeys, 3 rabbits, 7 dogs, 3 sheep, and numerous other animals were used, into some of which whole scirrhus tumors were introduced into the abdominal cavity. In no case was a cancerous tumor produced, and the common sequence was the absorption of the graft. These experimenters are of the opinion that the few successful inoculations reported are due to lack of thoroughness in the examination of the growths produced.

Senn (Surgical Bacteriology) mentions Billroth, Maas, Doutrelepont, Alberts, Senger, and others as having failed in their inoculations, and in his own observations, which were made upon dogs, cats, rabbits and guinea pigs, saw no other change than an invariable failure of the graft to increase in size.

Duplay and Cazin (C. R. Soc. de Biol. Paris, 1892, February 22), in a series of 22 inoculations of cancerous tissue from man to rabbits, guinea pigs, and dogs, attained no positive success, the fragments of tissue being absorbed. In a second series of experiments made in accordance with the idea of Hanau, from dogs to dogs, no other changes than inflammation and subsequent absorption could be detected.

Fischel (Fortschritt der Med., 1892, No. 1) inoculated 23 rats, using as material 3 scirrhus cancers of the mamma, 9 other carcinomata, and 2 sarcomata. All the inoculations were made within fifteen minutes after operation for the removal of the tissues, but not one of the experiments was a success.

It would be useless to add to this already long list, as its results are almost uniform. The work of Langenbeck has been rendered negative by the examination of his specimens by Virchow; that of Follin, Seburt, and Goujon, is useless because no microscopical diagnosis accompanies it; and as that of Hahn is but an artificial metastasis we are left nothing but the three inoculations of Hanau against hundreds of carefully made but unsuccessful attempts. The fact that Hanau's three experiments were all successful is a little suspicious, yet we will not reject his experiments, because spontaneous cancer in animals is not rare, because cancer seems to run in families, and because cancer occurs in the old. We can conceive of old rats with a family predisposition to cancer developing squamous epithelioma in consequence of the irritation caused by the operation, independently of what tissue was introduced.

The great weight of evidence, however, is such as to confirm the assertion with which we started out, that cancer can not be transmitted from one individual to another by inoculation.

There are numerous cases on record where carcinoma of the breast has subsequently given rise to carcinoma of the skin of an arm kept applied to it; where carcinoma of the lower lip has seemingly inoculated the upper lip, and where cancer of the penis has resulted from contact with a cancerous uterus. The first two illustrations amount to no more than the experiments of Hahn; the latter is so extremely rare that it may have arisen spontaneously in every case. We must not omit to consider in relation to such cases that the discharges from cancers are usually irritating, excoriating, and may in this way produce epitheliomatous growths on contiguous parts without the aid of any microorganism.

b. Cancer is a noninflammatory disease.

All the known infectious diseases, except malaria, are inflammatory in type. Tuberculosis, lepra, syphilis, actinomycosis, and glanders are primarily inflammatory, secondarily degenerative. Typhoid fever is more purely inflammatory, while little degeneration occurs in anthrax and charbon symptomatique. Cancer is utterly unlike any of these, being a simple hyperplasia of epithelium, extending into

neighboring interstices. I expect to be challenged on this ground and to have the objection raised that the coccidiosis of the rabbit is an infectious disease, but non-inflammatory, and that the resemblance of cancer to this disease is greater than that existing between cancer and other infectious diseases. To this we must reply that coccidiosis *is* an inflammatory disease and that, while it is at first a simply parasitic disease of the epithelial cells, it becomes a chronic inflammation of the mucous membrane with subsequent fibroid thickening, hypertrophy, and polyposis. That there is little homology between it and cancer has already been explained.

The great difference between cancer and the infectious diseases can be more conveniently observed in the secondary than in the primary foci. In tubercle, for example, the secondary formations are formed by the dissemination of the bacilli, and wherever a bacillus falls chemotaxis calls forth a body of leucocytes, connective tissue cells "Wanderzellen," "Schlummerzellen," etc., which, together with the cells already present in the part, form the node. In cancer nothing like this takes place, and we can not conceive of the dissemination of "cancer germs" producing the secondary, especially the lymphatic, growths of this disease unless we believe in the transmutability of tissue which will permit the mesoblastic tissues to assume an epiblastic type, an opinion which few will support at present. The secondary growths of cancer depend upon the transportation and multiplication of cancer (i. e., epithelial) cells. In their new habitat these foreign cells not infrequently conform to the normal mode of growth and take on their normal arrangements, so that even in nodules in lymph glands, fibrous tissue, etc., distinct alveoli may be observed. I can not conceive of epithelial cells, the hosts of irritating parasites, taking on such a rapid and healthy growth with so little variation from the normal.

c. Epithelium is normally a variable tissue.

Our discussion of the subject would be far from complete should we neglect the peculiarities of the tissue in and from which carcinoma grows, which may have a most important bearing upon the development of the tumor. In youth epithelial tumors are rare, and the changes to which the tissue is subject are overshadowed by the pronounced growth of the connective tissues. As age advances a change in the body equilibrium occurs, in which the formative energy of the connective tissues ceases and distinct changes in the epithelium occur. Upon the face and hands of the aged the skin becomes thin and transparent, and there is a tendency for cellular proliferation to occur in local areas which appear as slightly elevated brownish spots. In some cases these areas send out irregular processes which descend into the deeper tissues and form the nucleus of a squamous epithelioma.

Bowlby (Brit. Med. Journal, 1892, II, p. 7) made a systematic study of the mammary glands of persons at and beyond middle life and found in all of them distinct changes in the form of proliferation of cells and alveoli. Beadles (*ibid.*) studied the noncancerous portions of mammary glands amputated for cancer, and while in all of them he found, as Bowlby had done, proliferation of cells and alveoli, in some he found cellular infiltration and irregular cellular proliferation. The former of these changes we are inclined to attribute to age, the latter to the cancer. In the Morton lecture on cancer and cancerous diseases for 1892, G. Sims Woodhead mentions his observations upon a large number of tongues which he had the opportunity to study, and tells us that in advanced age the epithelium shows a distinct tendency to thicken and grow with the production of descending processes.

In addition to these changes consequent upon advancing age, we find a great variety of appearances due to the operation of external agencies. Not to go into detail, let us simply consider the following: The hands of laborers, being exposed to friction, are subject to general thickening of the epidermis with immense thickenings or callosities at the most exposed portions. When the boot pinches the foot, a more circumscribed epidermal thickening (clavus) is produced. If one or a small group of papillæ are irritated, a very different growth, involving the lower layers of the skin, and more organoid in character—verruca—is produced. Upon delicate

mucous surfaces, chronic irritation produces polypi whose epithelium contains glands. Nor are the changes of the epithelium produced solely by factors operating upon it, but may be brought about by changes in contiguous tissues. Councilman (Johns Hopkins Bulletin, Vol. I, No. 2, p. 20, January 1890), has shown that when, in consequence of chronic inflammation, granulation tissue is found beneath the epidermis, the epithelium grows down into the cutis, giving rise to a branching system of epithelium beneath the skin, probably occupying the lymphatic vessels, presenting a picture almost identical with squamous epithelium and even containing epithelial pearls, but circumscribed in growth by the denser tissues beneath, whose resisting powers at once check its progress.

I recently obtained from a friend a portion of a uterine cervix containing a rather minute laceration of long standing. In the process of repair, the epithelium had descended to the bottom and almost filled up the fissure. At the outer part, where the tear was clean, the base of the epithelium was smooth but at the termination of the tear, where it had separated neighboring muscular bundles but partly, and left numerous crypts, the epithelium had grown with a branched arrangement fitting into these interstices, and only checked in growth by the greater resistance offered by the undisturbed tissues beyond. Had there been no healthy tissue in these two instances to check the descending process of epithelium in their growth, we must have had resulting an epithelioma. Indeed, who can say what further extension might have resulted in the course of time, had the cervical tissue been suffered to remain *in situ* instead of being excised?

In this brief fashion we have endeavored to show that the character of epithelium is such as to make a specific cause for its development unnecessary.

After all that has been said it would be folly for us to accredit to the very occasional protozoon-like forms which we have mentioned more importance than that given to the accidentally present bacteria. Bacteria of various kinds are nearly always found in carcinoma, gaining access from the air, water, or food either directly, when the tumor occupies a surface, or through ducts, etc., when it is glandular. It seems to me not improbable that if bacteria can thus enter the abnormal tissue, protozoa of various kinds could do likewise. Andrews, who studied 7,881 primary cancers (Pacific Rec. M. and S., San Francisco, 1889–'90 II, 195), does not at all prove that a specific organism is necessary for cancer by showing that primary cancers are most common upon the most exposed surfaces, but only that upon most exposed epithelial surfaces the greatest mechanical, chemical, and physiological abuse is received.

I do not believe cancer to be due to any specific cause, but to have its origin from numerous and often cooperating causes, of which much still remains to be learned, but which will show us that the principal factor in its production is an inherent proliferative tendency in the epithelium itself, in which sense the origin of carcinoma may be said to be epithelio- not parasito-genetic,

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THE ACTION OF RATTLESNAKE VENOM UPON THE BACTERICIDAL PROPERTIES OF THE BLOOD.

By DR. W. H. WELCH, *Professor of Pathology in Johns Hopkins University, Baltimore, Md.*, and DR. C. B. EWING, U. S. Army.

Dr. W. H. Welch reported the results of experiments made by himself and Dr. C. B. Ewing, U. S. Army, to determine the action of rattlesnake venom upon the bactericidal properties of the blood. The venom was obtained directly from a living rattlesnake in a sterilized saucer, according to the method recommended by Weir Mitchell. This venom was injected in varying doses subcutaneously into rabbits, which died at intervals varying from one-half hour to four hours. Immediately after death the blood was withdrawn by means of a sterilized glass pipette from the

right auricle and posterior rena cava, about 6 to 10 c. c. being readily obtainable in this way. At the same time blood was obtained for a control experiment from a healthy rabbit. In some instances the blood of the animal before it was poisoned by the venom was previously tested as to its bactericidal power. After standing twenty-four hours in the refrigerator, 1 to 3 c. c. of the venom serum and of the normal serum were pipetted off into sterilized test tubes and inoculated with the bacteria to be tested. The bacillus coli communis and the bacillus anthracis were used for this purpose. Roll or plate cultures in gelatine or in agar were made in the usual way to determine the number of bacteria inoculated into the serum and at varying intervals of time up to one week to determine increase or diminution of the bacteria planted in the serum. The experiments showed that the blood serum of rabbits killed with the venom was nearly or entirely devoid of the power of destroying the bacteria used for the experiments, whereas the normal serum was capable in a few hours of destroying thousands of these bacteria.

The bearing of these experiments upon the rapid development of post mortem decomposition following death from snake bites and also upon individual predisposition to the invasion and multiplication of bacteria in the living body was considered.

INFLUENZA: CAUSES, COMPLICATIONS, AND TREATMENT.*

By RAMON GUITERAS, M. D., New York.

HISTORY.

Influenza, or la grippe, is probably richer in names and symptoms than any other known disease. I will mention a few of the former by way of illustration. They are: Epidemic catarrhal fever, rheuma epidemicum, cephalalgia contagiosa, Ziep Schafhusten, Hühnerweh, Blitz catarrh, Russian disease, Italian fever, Spanish catarrh, etc., depending mainly on the variety of symptoms and the locality from which it comes.

We often have the question asked us "What is influenza?" I think that a safe answer to this would be, It is an epidemic cold depending upon some as yet unknown cause.

Colds have a tendency to settle in certain parts, generally the weaker ones, and influenza does likewise. The systemic symptoms occur in varying severity in all its varieties, while the catarrhal symptoms cluster about certain organs where the power of resistance seems to be naturally least. These epidemics date before the Christian era, an attack having occurred in the Athenian army in Sicily 415 B. C. After this they began to appear at irregular intervals, spreading over Europe generally in the direction of from east to west, of which no exact or complete records have been kept up to the year 1510, when it prevailed in the British isles to an alarming extent and quite an accurate account of the epidemic was written. Various well-recorded outbreaks followed in the years 1557 to 1879, about twenty in all, besides others of minor importance. These varied in severity, symptoms, number, and suddenness of the attacks.

ETIOLOGY.

Predisposing influences, none. People are attacked without distinction of age, sex, occupation, or social standing. Previous or present illness affords no protection. One attack renders no immunity from another. Overcrowded, unhealthy, badly ventilated, and damp dwellings render attacks more severe, although the dwellers

* From observations made while investigating this disease for the health department of the city of New York.

are no more prone to it. Influenza may occur in any season. It occurs usually in the autumn, often in the spring, and sometimes in the summer and winter. Latitude has no effect, as in the epidemic of 1837 it appeared at the same time in England and Cape Colony, that is, in directly opposite zones and seasons. Climate has no influence, as it occurs equally in the dampest and driest regions. Certain meteorological signs and coincident phenomena have been remarked as preceding many of the previous epidemics, such as foul fogs, volcanic eruptions, earthquakes, etc.

The rapidity with which it spreads and the great numbers who suffer from it at the same time and in the same way certainly point to some specific poison which is carried by the air as a disseminating medium and excites the disease. This poison was supposed by many for a long time to be the sulphur and other matter thrown from the volcanoes, which was carried about in dust-fog currents, a foul fog having been generally noticed before an epidemic or accompanying it. In this enlightened age, however, I think we are justified in believing that the exciting cause is a micro-organism.

The investigations of the bacteriologists in searching for micro-organisms have resulted as follows:

For several years the diplococcus pneumoniæ of Fraenkel and Weichselbaum, the streptococcus pyogenes, the staphylococcus pyogenes aureus, and several scattering forms were the only ones found, until Dr. Pfeiffer, of Berlin, in 1892, discovered a bacillus in the secretions of patients suffering from influenza, which was declared by Koch, Kitasato, and others to be the true germ of this disease. This bacillus was about the thickness of bacillus mouse septicæmia, but only half the length. As only the two ends stain, it is very hard to distinguish it from the diplococcus and streptococcus. Former observers seeing these mistook them for the latter. They were cultivated by Kitasato and others.

About the same time Bruschettini * found the same germ in the blood of those suffering from the disease.

The question why an epidemic may break out at one time and then for years remain dormant is not an easy one to answer. It is probable that there are cycles in which peculiar seasons recur, and that such cycles are associated with the reproduction of similar disordered conditions in the health of man.

SYMPTOMS.

There is no disease in which the characteristic symptoms vary as much in the various epidemics as they do in influenza, and there is also no other in which the symptoms vary so much in point of predilection and severity. The predilection depends upon individual weakness and the susceptibility of certain systems, as the nervous, respiratory, alimentary, genito-urinary, etc., to disease. The severity depends in a great measure on the condition of the patients, at the time of the attack, as to their resisting powers, the amount of exposure to which they have been subjected, the character of the epidemic, etc. Almost everyone during an epidemic is attacked, although some suffer to such a limited degree, as a slight headache, gastric disturbance, or a feeling of languor, that they think they have escaped. The varieties of the attacks during the different epidemics have given rise to several classifications, depending upon the different seats of the disturbance, *e. g.*, cephalic, thoracic, abdominal, cerebral, guttural or bronchial, intestinal or typhoid. This latter was the classification of Sydenham, and depended upon epidemics extending over a period of three hundred years. The classification preferred at the present date seems to be that of the nervous, catarrhal, and gastric; and this was the classification that I adopted in my last writings. At the present date, however, having watched the epidemics carefully during the last few years, I am inclined to classify the varieties into two chief groups, and to subdivide them accordingly. In doing

* Ricerche bac. sull. infl. 1ª communicazione preventiva. Riforma Medica, Gennaio, 1892.

this I strike out the gastric variety, placing it under the catarrhal. The classification would then consist of but two principal varieties, viz: (1) musculo-neuralgic; (2) catarrhal; and these I believe are mixed in about 90 per cent of the cases. Musculo-neuralgic symptoms almost always complicate the catarrhal form, although catarrhal do not nearly as often complicate the musculo-neuralgic.

These varieties, with but few exceptions, have the same general symptoms and tend to conclnde in the same way. They are:

Onset.—Feeling of weakness, faintness, dizziness, chilly sensations, constipation, perhaps nausea, vomiting, anorexia, languor, or high fever.

Acute stage—lasting from a few hours to a week, during which we have frontal headache, often pain in orbits and eyeballs, loss of appetite, strength, and spirits, feeling of languor, lassitude, inability to do any mental or physical work; rheumatic pains variously distributed in back of neck, small of back, costal region, or calves of legs; bowels may continue constipated; urine high-colored; foul tongue and breath; fever generally continues, of a remittent type, with evening exacerbations.

Stage of prostration—lasting from a few days to a few weeks, marked by nervous prostration, general feeling of languor, poor appetite, and generally a bronchitis of a dry nature. In children and infants the symptoms are not as marked.

In children they are as follows: Vomiting, headache, moderate fever, coated tongue, constipation, followed by a bronchitis lasting about a week. In infants symptoms of gastro-enteritis, vomiting, diarrhea, moderate fever, rapid pulse, and occasionally convulsive movements.

We will now consider the varieties individually and point out the special features of each.

Musculo-neuralgic variety.—This variety is generally associated with the catarrhal as well, but when taken individually is especially marked by severe headache, pain in the eyeballs, rheumatic or neuralgic pains in various localities, restlessness, at times wakefulness, occasionally hyperæsthesia, and following these a stage of great nervous prostration, lassitude, languor, sweating, etc.

The catarrhal variety is characterized by symptoms pointing to a congestion of certain organs or their mucous tracts, and is divided into three principal groups:

(1) The respiratory, which is the form that has hitherto been called catarrhal, guttural, bronchial, or thoracic.

(2) The alimentary, embracing the varieties spoken of as gastric, intestinal, abdominal, or typhoid.

(3) The genito-urinary, which has never before been considered.

A general catarrhal also occasionally occurs, in which form the symptoms included in the first three groups are combined in varying severity in one attack.

These groups are further subdivided according to the locality from which the symptoms arise.

The respiratory-catarrhal form is generally marked by a catarrh beginning in the upper respiratory tract, with pain in the frontal sinuses, eyes painful, congested, and watery, profuse and watery nasal discharge, feeling of stenosis over the bridge of the nose, marked angina, occasionally tonsilitis, tickling in throat, hoarseness, ending in a bronchitis lasting from a few days to several weeks. Epistaxis and hæmoptysis occasionally occur. When, as is rarely the case, it is limited to the upper respiratory tract, we have only the symptoms usually accompanying nasal and pharyngeal inflammations.

The catarrh of the middle respiratory tract is that localized in the pharynx, larynx, and trachea, principally in the latter, the former generally being inflamed sympathetically. This is characterized by a hoarseness and sense of excoriation and tickling in the trachea (tracheitis), a feeling of laryngeal thickening producing a spasmodic cough corresponding to that of croup in children. In other cases it resembles more a bark of the variety known by the Germans as Schafhusten. In

still others it has a whistling note. In the catarrhal variety of the lower respiratory tract a bronchitis generally follows or is associated with the upper or middle respiratory form. It is a peribronchial congestion, giving rise to a troublesome spasmodic cough. Auscultation shows roughened breathing, fine subcrepitant râles, often sonorous and sibilant over both sides. Pulse, temperature, and respiration slightly elevated, but going down gradually to normal. Fever often remittent. Neuralgic symptoms generally associated with it.

Alimentary.—In the gastric form we have violent and frequent vomiting, nausea, pain, loss of appetite, constipation, often severe headaches, faintness, and dizziness.

The gastro-intestinal form has, in addition to the vomiting and other symptoms of gastric disturbance, a diarrhea of the usual form that accompanies a subacute gastro-enteritis.

The intestinal form is principally a colitis accompanied by marked tenesmus, stools diarrheal in character, often mixed with mucus and tinged with blood. Dysenteric symptoms of a very grave nature occasionally set in, causing death in a few hours.

The genito-urinary variety is a rare form, generally of a mild type and frequently not known to the person affected. My attention was first called to it by the great number of applicants for insurance who had to be postponed during the epidemics on account of high specific gravity and albumin. These I found to be suffering from influenza. Their symptoms constitutionally were the same as those suffering from the respiratory or alimentary form. The condition was generally localized in the kidney, and the urine showed the ordinary symptoms of renal hyperæmia, i. e., high colored, high specific gravity, albumin in small quantities, blood-corpuscles, and occasionally hyaline casts. This condition usually lasted but for a few days.

The vesical type was similar to that of cystitis of the vesical neck. It was very rare. Constant desire to pass water, pain over pubes, and a sense of heaviness in the perineum. Urine high colored, high specific gravity, some mucus.

The urethral and vagino urethral forms were still rarer, and were accompanied by a watery, glairy, mucoid discharge, attended by a congestion of the parts and burning during micturition. These were generally combined with some other forms of the genito-urinary catarrhal variety. They are very rare and ephemeral.

General catarrhal fever, i. e., catarrh of all the mucous membranes, was observed in several cases, characterized by high fever, rapid pulse, vomiting, diarrhea, painful and frequent urination of a dark-red color, with a high specific gravity and a slight amount of albumin, slight conjunctivitis, coryza, laryngitis, and bronchitis. The attack was generally very acute, though of short duration.

COMPLICATIONS.

By far the greater number of complications and the most serious are those connected with the respiratory form, which I will mention in order, going from above downward.

Conjunctivitis is generally associated as a symptom with the upper respiratory variety.

Epiphora due to stenosis of duct.

Epistaxis occurs in about two per cent of the cases. Occasionally it is quite severe, and in some cases has continued for twenty-four hours.

Follicular tonsilitis has been observed in several cases.

Quinsy, complicating many previous epidemics, has not been observed in the recent ones.

Eustachian catarrh and otitis media are complications which exist in a great many cases, and are at times only noticed by the specialists, general practitioners frequently attributing the symptoms to the neuralgic pains of the disease, or to a sense of fulness due to quinine, which is being taken by almost all influenza patients; and thus ruptures of the tympanum have occurred in many cases where paracentesis ought to have been performed.

Loss of the senses of smell, taste, and hearing sometimes occur, evidently due to a peripheral paralysis of the nerves of special sense.

Glandular enlargements have not been prevalent during the recent epidemics, probably owing to the mild forms of catarrh in the upper and middle respiratory tracts. There are two varieties of these. Enlarged cervical, such as occurred in former outbreaks, where the catarrhal symptoms of the upper respiratory tract were principally involved, and which were often very malignantly inflamed. Enlarged bronchial and tracheal glands (adénopathies bronchiques). These cause a feeling of thickening and packing about the upper bronchus and trachea, the latter having a board-like feeling. A sense of soreness is also connected with it, both bronchial and peribronchial. These glandular enlargements can be made out by percussing after the method of Gueneau de Mussy.

Hæmoptysis was observed only in a few cases and was very slight.

Capillary bronchitis and bronchitis of the smaller tubes are complications of the ordinary form of bronchitis by direct extension. They generally occur in women and at any age. They are very fatal, the great prostration seeming to affect their power of expectoration so that they "choke up" and die asphyxiated. These are often followed or complicated by a lobular pneumonia.

Lobular pneumonia is very acute, lasting from three to seven days. It generally occurs in the old, the middleaged, and the sickly, although young adults are frequently affected. It seems to be most common among females. A chill sometimes introduces this complication; in fact, I have noticed a chill in this variety more frequently than in any other. It begins at the bottom of the lung and spreads upward. Death results either from heart failure or asphyxiation.

Lobar pneumonia generally attacks patients during the stage of prostration, is frequently double, comes on generally without a chill, and is accompanied by a very high fever. It occurs generally in men, 80 per cent of those observed were between the ages of 40 and 55. Death is usually from heart-failure and occurs in from two to five days.

Grippe-pneumonia is a form often spoken of, and is a condition following a pulmonary congestion. It is generally in both sides, comes on insidiously without being accompanied by a chill or the crepitant râle as in ordinary cases. The consolidation usually begins at the base or the middle of the lung.

Pulmonary hyperæmia is a frequent and dangerous complication, and occurs with much greater frequency than it is supposed. This should be treated at once with the greatest care, and every precaution taken lest it develop into a grippe-pneumonia. It is very similar to lobar pneumonia in its early stage, excepting that it is less severe and covers a greater area. It is due to a recession of blood from the surface, or from some other adjoining organ, to the lungs by reflex action through the vasomotor system. The lungs seem to be most favorably adapted for such a congestion on account of their great vascularity and the lack of resistance to the dilatation of the capillaries in comparison with that found in other organs. Just why this particular disease, influenza, happens to produce such a congestion is difficult to explain. It is obvious, however, that it holds the respiratory tract as a seat of predilection, as almost all its forms are accompanied sooner or later by a congestion either of the upper air-passages or a peribronchial one of the lower, although an active hyperæmia of the parenchyma itself is comparatively rare. Diarrhea occurs in many cases, but is simply the intestinal form of the alimentary variety.

Dysentery is a dangerous form of the colitis occurring in the same variety. In the two cases which came under my observation death resulted in two days. In both cases the first day's discharges were simply diarrheal.

Cholera, a sequela which is so much feared, especially in Europe, will probably never make much headway here. It does follow influenza, and has during the last two years. It can be more easily guarded against, however, than influenza, as it is more distinctly contagious. It is more liable to attack those who have suffered

from the gastro-intestinal form of the disease, which often occurs and leaves the mucous membrane in a somewhat denuded condition.

Typhoid fever as a sequela has not been observed in any fatal cases in New York during the late epidemics, but the typhoid condition has been noticed frequently, and has been observed especially in some cases of dysentery, bronchitis, and broncho-pneumonia.

Meningitis has occurred in a number of cases, death resulting in about two days.

Nervous prostration, which is such a pronounced symptom in the various stages of influenza, has proven a most obstinate sequela. Acute hyperæmia of the tongue has also been observed. The tongue was enlarged, reddened, hard, and tender to such a degree that the pressure of the teeth against it was quite painful. The tongue felt too large for the mouth and protruded, resting on the lower teeth. The papillæ on either side were enlarged and sensitive.

THE VARIOUS DERMATOSIS OF INFLUENZA.

The principal one of these is the erythema (influenza erythematosa). This generally occurs with influenza of the gastric type, during its acute stage, and closely resembles scarlet fever. It comes on as a pinkish blush over the face, chest, and arms, and is not punctate. The tongue has a thick, white coating, with enlarged papillæ on the sides near the tip. The skin is moist. Miliaria occasionally occurs. Erythema multiforme is also seen in this connection. Alopecia areata has been reported as a complication. Herpes zoster was observed by me in two cases during the last epidemic.

DIAGNOSIS.

The only diseases with which influenza is liable to be confounded are coryza, bronchitis, tonsilitis, dengue, scarlatina, and rheumatism.

Acute coryza and bronchitis would be excluded by the absence of severe headache, muscular pains, great prostration, and anorexia, although doubtless if these occurred during an epidemic they would be more or less due to it, and most probably mild in form. Follicular tonsilitis has many symptoms in common with influenza, but would be excluded through the absence of severe frontal headache, rheumatic pains, etc.; although I have every reason to believe that follicular tonsilitis has occurred in several cases of influenza as a complication.

Dengue resembles in a great measure the muscular neuralgic form of the disease. It would be excluded, however, on account of the different character of its onset—it generally taking from two to three days for the temperature to reach its height—the character of relapse, the eruption, the pain, swelling in joints, the enlarged glands, etc.

The rapidity with which the influenza has traveled and the territory which it has covered differ also from dengue, which occurs generally in circumscribed areas in the south of the United States, Spain, India, or Africa.

SCARLATINA.

This disease, with which the late epidemics have been most confused, is excluded on account of lack of punctate character to the eruption, strawberry tongue, and angina; also on account of speedy disappearance of the eruption, which lasts about twelve hours. The eruption, however, is quite similar in its general erythematous blush, and when it is associated with some angina and high fever the resemblance is quite strong, especially as the tongue shows some enlarged and reddened papillæ on its sides near the tip, which stand out prominently in contrast with the white coating covering it.

PROGNOSIS.

Good in most of the cases. The disease is self-limited, and if the patient is careful there is no question of speedy recovery. The only danger is when it occurs in the

old and the infirm, or those suffering from chronic troubles. One thing noticeable in the last epidemics was how few phthisical patients, comparatively speaking, have died from its effects, although in many case they have succumbed from intercurrent bronchitis. In Bright's disease and valvular disease of the heart the influenza is more fatal. A few deaths were due directly to the disease, but these occurred in cases of old age, tumors, and other cachectic conditions, in which the patient died within twelve hours, probably from the shock of the sudden onset. In two other cases of feeble women, death occurred in two days, due to heart-failure.

TREATMENT.

Rest in bed during acute stage. The patients should remain at home until temperature is normal. It would be advisable for them to remain in the house until entirely well, but as they generally will not do this, it is important that they should remain at home evenings. They should be very careful in regard to their clothing, the wearing of rubbers, overshoes, etc. They should avoid all drafts of air, as in the stage of prostration and sweating they are very susceptible to pulmonary complications. They should ride in cabs, if possible; if not, in horse-cars, or the front or rear car of the elevated.

At onset move bowels, calomel two grains every two hours until they have moved, or two compound cathartic pills in one dose. At bedtime, quinine and Dover's powders, with a hot whisky punch.

For headache, fever, and muscular and neuralgic pains, give antipyrine, ten grains every two hours, with whisky, one-half ounce, until the headache is relieved. Two of these powders will generally be sufficient to relieve the most obstinate. It is not advisable to give more than three of them, but in case they do not produce the desired effect, to change to antifebrin or phenacetin, in five-grain doses, every two hours. Whisky should be given with these drugs, as it hastens their action and tends to counteract their depressing effect. In case the muscular pains are obstinate, salol, in five grains, or salicylate of soda, in fifteen-grain doses, three times a day, will generally relieve them.

Great anorexia and weakness being present, milk punches should be given every two hours, if well borne, during the acute stage.

In all stages of the disease whisky is the remedy *par excellence* to counteract the great prostration, and should be taken three times a day throughout the attack. If whisky is not well borne, give champagne, brandy, or sherry. Quinine is also a standard remedy, and is useful both as an antipyretic and a tonic. During the acute stage it should be given, if the stomach can bear it, in five-grain doses three times a day, and in the stage of prostration following it should be given, purely as a tonic, in three-grain doses, in combination with nux vomica and iron in pill or solution. In the alimentary forms, where there is considerable vomiting, good results have followed a milk diet, with a powder of bicarbonate of soda, pepsine, and bismuth, ten grains of each every four hours. If diarrhea is present add one-eighth to one-tenth of morphine to each powder and increase in frequency if necessary. All very sick cases should be put on a milk and whisky diet—two and a half quarts of milk and four ounces of whisky a day.

In catarrh of the upper respiratory tracts a pill of belladonna, camphor, morphine, and quinine every two or three hours gives speedy relief. In cases of pharyngitis and tonsilitis an astringent spray or gargle should be added.

When the laryngeal and tracheal symptoms are most pronounced inhalations of tr. benzoin comp. afford the most relief. In bronchitis of the dry and semiasthmatic form, which generally occurs, and which seems to be more of a congestion of the bronchial mucous membrane with a spasmodic cough, a mixture containing belladonna and morphine will give great relief. A preparation of codeia, gr. one-sixth; am. iodid., gr. 3, in mist. expect. Stokes, 3 j., every three hours is also very valuable in the treatment of this bronchial condition. In case of bronchitis with abun-

dant secretion, muriate of ammonia or the more stimulating expectorants must be given. In the genito-urinary variety simply place the patients on a milk and Vichy diet, and confine them to the house. Complications should be treated accordingly, and digitalis and strychnine should be given where the heart-action is weak, to prevent heart-failure, as influenza seems to have a depressing influence on the heart-action.

In the musculo-neuralgic variety of influenza we have a specific in the pill of phenacetin and salol, 2½ grains of each every three hours.

When severe nervous prostration follows, a tonic consisting of the phosphates, with quinine, iron, and strychnine, should be given. The phospho-muriate of quinine (Phillips's tonic) is excellent in these cases.

In conclusion, after having observed so many cases during the almost annual epidemics of the last few years, and so many sporadic ones between the epidemics, I think we have abundant ground for suggesting the possible advent of a new disease of an ephemeral nature.

PATHOLOGY AT THE INSTITUTION FOR FEEBLE-MINDED CHILDREN AT ELWYN, PA.

By HENRY W. CATTELL, A. M., M. D.,

Demonstrator of Morbid Anatomy at the University of Pennsylvania; Prosector to the American Anthropometric Society; Pathologist to the Presbyterian Hospital of Philadelphia; to the Institution for Feeble-minded Children at Elwyn, etc.

PRELIMINARY PAPER.

The Pennsylvania Institution for Feeble-minded Children, of which Dr. J. N. Kerlin is the superintendent, affords abundant opportunities for the clinical and pathological study of lesions which have to do with those deficient or weakened mental conditions not usually classified under the head of insanity.

The number of children in the institution on September 1, 1893, was 915, of which 365 were girls and 550 were boys. During the 6 years Dr. A. W. Wilmarth was assistant physician there were performed 111 autopsies. 102 of the brains and a few of the cords from these cases which were carefully studied, both macroscopically and microscopically by Wilmarth, are preserved in the museum. Since my appointment as pathologist, in the beginning of the present year, there have been performed 17 autopsies. The brains and nearly all of the cords from these cases have been hardened in Müller's fluid and are now mostly ready for microscopic study.

While this number of cases is of course entirely too few to warrant the formation of many conclusions, I have thought it wise to bring this field of investigation before you in order that written suggestions might be made in regard to the carrying on of the work in the future.

The following investigations are being carried on in the institution at the present time:

(1) An attempt at a classification of idiocy, imbecility and feeblemindedness from a clinical standpoint; from a pathological standpoint.

(2) During life: (*a*) Personal descriptive blanks. (*b*) Etiological history blanks. Of *a* and *b* about 4,000, representing some 2,000 cases have been prepared during the superintendency of Dr. Kerlin. (*c*) School progress, military drill. Trade. (*d*) Station, gait, peculiarities and deformities, reflexes, speech, health, sample of writing. Blood, corpuscles and hæmoglobin, sp. gr. Reaction, sense of feeling, taste, smell, hearing, sight, electricity, heat and cold. Epilepsy. Photograph. Parasites. Ears, Growth, musical ability, dynamometric, psychological tests; money, age, weight, size, distance and figure tests. Anthropometric measurements, casts of palate, teeth. Examination of urine. Impress of finger and toes.

(3) Post mortem record: Weight of brain, photograph of the fresh brain; cast of the hardened brain; anthropometric measurements of the interior of the skull; anatomical anomalies; macro and microscopic study of the brain, cord and cranial nerves.

The following blank forms are used as a guide:

(*a*) Personal Descriptive Blank.

Reg. No. ———. L. B. No. ———. P. ———.

1. Name in full of candidate for admission?
2. Where now living?
3. Date of birth?
4. State, county, and town where born?
5. Was the child peculiar from birth?
6. When, and in what manner was any peculiarity first manifested?
7. Is he of the usual size and weight for age?
8. Describe the peculiarities in the shape of the head.
9. Describe peculiarities of the features.
10. Color of the hair and eyes?
11. Are sight and hearing good?
12. Is the mouth open or well shut?
13. Are the teeth good?
14. Is the speech perfect?
15. What peculiarities of speech are there?
16. Is he right or left handed?
17. Describe any irregularity in walking.
18. At what age did he commence to walk?
19. Does he go up and down stairs properly?
20. Describe any bodily deformity.
21. Describe any paralysis.
22. Has he any odd movements of body, limbs, or face?
23. Does he laugh or weep without cause?
24. Is he nervous?
25. Has he had measles?
26. Has he had whooping-cough?
27. Has he had scarlet fever?
28. Has he had varioloid or smallpox?
29. Has he been vaccinated?
30. Describe any skin or scalp disease he may have had.
31. Has he had epilepsy or fits? When?
32. If convulsions or spasms now, or recently, state their character, and how often.
33. Has he had brain disease?
34. If yes, state particulars and when.
35. Has he had any disease of the lungs or bowels?
36. Are the hands and feet cold?
37. Are the feet easily blistered or liable to chilblains?
38. State any special preference for food.
39. State any special aversion for food.
40. Does he masticate properly?
41. What are h table habits?
42. Does he use h knife and fork?
43. Is he gluttonous?
44. Will he eat garbage?
45. Does he use tobacco, etc.?
46. Is he sensitive to pain?
47. Is he indolent or active?
48. Is he noisy?
49. Is he affectionate?
50. Will he obey a command?
51. Is he trustful and truthful?
52. Is he obstinate and passionate?
53 Is he destructive?
54. Is he stealthy?
55. Is he vulgar?
56. Does he stray from home?
57. Is he heedless of danger?
58. Is he dangerous with fire?
59. Will he destroy clothing or furniture?
60. Is he tidy or careless in dress?
61. Does he soil or wet the bed?
62. Does he soil or wet day clothing?
63. Has he any other unfortunate habits?
64. Does he understand language?

65. Does he understand a command?
66. Can he do an errand?
67. Is he fond of play? What kind?
68. How does he spend h time.
69. Is he fond of children?
70. Is he fond of music?
71. Is he fond of animals?
72. Does he look steadily?
73. Does he recognize color?
74. What colors does he know by name?
75. Does he recognize form?
76. Does he know the alphabet?
77. Does he read? How much?
78. Does he count? How many?
79. Does he sing? What songs?
80. Can he commit the words of a song or hymn?
81. Can he throw a ball?
82. Can he catch a ball?
83. Can he tie a shoestring?
84. Can he dress self? How thoroughly?
85. Can he wash self?
86. Can he write or draw?
87. Can he do housework? What kind?
88. Does he handle tools?
89. Can he make anything? What?
90. What is h power of attention?
91. What is h power of imitation?
92. What is h power of memory?
93. Is he religiously inclined?
94. Does he go to church?
95. Does he go to Sunday-school?
96. Is he easily managed?
97. What correction, if any, is used at home?
98. With what result?
99. Please state any known or supposed cause for the child's condition.
100. What do you expect from a course of training?
101. What is the name and address of the family physician who has attended the child?
102. What are the names and address of the parents?

Name of person filling up above blank, ——— ———.
Address, ——— ———.
Date: ——— ———.

(*b.*) Etiological History of ——— ———

Reg. No. ———. L. B. No. ———. P. ———.

1. Please state birthplace of father.
   Please state birthplace of mother.
   Please state birthplace of this child.
2. What has been the father's occupation?
3. Was the child born at full term?
4. Was the labor ordinary or difficult?
5. Were instruments used?
6. Was there deficient animation in the child at birth?
7. Had the child a convulsion soon after birth?
8. State the order of this child's birth—whether first born, or second born, etc.
9. Was the child nourished by its mother, or fed artificially? State any peculiarities in the early nutrition of this child.
10. Was a sickly or strong babe? If the former, how was it manifested?
11. Do you consider the cause of h condition to have been congenital, or is it the result of accident or acute sickness? In either case, please specify.
12. Was either parent subjected to any special overtax of mind or body immediately prior to the conception of this child?
13. Was the mother during this pregnancy subjected to any continuous anxiety or hardship, or exposed to any shock, accident, or specially painful emotion? If so, particularize, and the period of gestation when such disturbance occurred.
14. How many brothers of are now living? How many sisters of are now living?

HYPOPLASIA OF THE CEREBELLUM.

15. Are they of sound health in body and mind? Are there any peculiarities of constitution among them?

16. Are there deceased children? If so, please state the order of their birth, their sex, age, and the cause of their death, and whether their mental and physical powers were normal or not.

17. Have the parents had any dwarfed or malformed children?

18. Have all their children had complete coordination of all their movements?

19. What were the ages of parents when was born? Father, Mother,

20. Was either parent addicted to the use of alcoholic drinks, tobacco, or opium, prior to this child's birth?

21. Were the grandparents on either side excessively given to either of the above-named habits?

22. Had the general health of the parents been good previous to this birth, or had either of them been subject to paralysis, neuralgia, epilepsy, hysteria, chorea, eccentricity, nervousness, or constitutional taint?

23. Are both parents now living? If either is dead, of what disease, and at what age?

24. If grandparents are deceased, of what disease, and at what age?

Paternal grandfather.

Paternal grandmother.

Maternal grandfather.

Maternal grandmother.

25. Were the parents of this child related before marriage? If so, in what degree?

26. Were the grandparents on either side related before marriage? If so, in what degree?

27. Are there any instances of insanity or feeble-mindedness in the families of the father and mother, of their brothers and sisters, or in the ancestry of either side?

28. Is there any tendency to blindness or deafness in the families of either side?

29. Are there any instances of, or tendencies to, scrofula, to consumption, or to goitre, in the families on either side?

30. Are there any instances of paralysis, epilepsy, hysteria, chorea, neuralgic or sick headache, or any convulsive disorders in the families of either side?

31. State on this and the next page any other facts which in your judgment may seem to have a bearing, in this particular case, on the important subject of causation, after which please sign your name and address.

In conclusion I should like to present a brain before sections are made and the study completed.

There is almost entire absence of the cerebellum and great deficiency of the corpus callosum in a male, age 19, presenting incoordination of movements and psychic disturbances.

L. H., male, æt. 19, was the fourth child of heathy native-born parents. No instruments were used at his delivery, which was at full term. As a babe he had a weak back and did not learn to walk until he was 3 years old. When 5 years old he had an attack of scarlet fever and diphtheria, which interfered with his speech and walking and is the supposed cause of the child's trouble by his parents, though his not walking until 3 would lead one to think otherwise. He never had any convulsions, but often complained of dizziness. His gait is described as showing a slight stagger as though he was not sure of his steps, the feet being raised very high from the ground. His habits were good, and he had but little to say except when spoken to. Body longer than normal. He was able to work with his hands. His school progress was interfered with by defective eyesight, the nature of which was not determined, though he had external strabismus. Reflexes normal.

L. H. was a member of Company C, which is made up of middle and low-grade boys, varying in age from 12 to 20. Regular drills of an hour each are held daily. Capt. Weaver, the commander of the battalion, says that his gait was a very peculiar one in that his steps were short and quick, his trunk stiff and slightly bent forwards, with his head fixed and turned slightly towards one side. He had little or no idea of time, but was able to make easy movement on the march and in the drill, but never with any great degree of accuracy. He finally succumbed to an attack of tuberculosis.

At the post-mortem (Cattell, No. 555, Elwyn 126) the body was found to be very emaciated; head that of a microcephalic, with the cerebellum fossæ quite deep. Circumference of head, 18½ inches, nasion to inion 11¼ inches. The cavity for cerebellum (a cast of which was shown) measures 2 7/8 inches across. From the center of the middle clinoid processes to the internal occipital protuberance measures 2¼ inches. Weight of brain, 32¼ ounces. In removing the brain one was at once struck with (1) the great deficiency in the corpus callosum, the brain hardly being held together; (2) the small size of the cerebellum, the two lobes being practically of the same size; (3) the atrophy of left hemisphere, especially in the occipital region, and in the neighborhood of the fissure of Rolando.

FIEBRE AMARILLA.

Por el Dr. ANTONIO JOSÉ AMADEO,
De la Universidad de Pensilvania, Miembro del Real Colegio de Cirujanos de Inglaterra, etc.

LA FIEBRE AMARILLA.

(Conocida tambien con los nombres de tifus icterodes, tifo tropical, vómito negro, etc.)

Mucho se ha escrito sobre esta dolencia desde fines del siglo diez y siete, que con mayor detenimiento se ocuparon de ella los médicos de las naciones principalmente interesadas en el porvenir de las Antillas.

Al principio los epidemologos creyeron sin razon en su origen exótico; y aun en nuestros días hay quien sostiene fué importada sino del Asia, de las regiones Africanas por los buques dedicados á la trata de negros.

Las crónicas más antiguas aseguran que los indígenas americanos sufrieron sus estragos y los Españoles desde su llegada á estas playas.

Desoló á Caparra nuestra primera población, fundada á principios del siglo diez y seis, diezmando las tropas de las escuadras que en los tiempos de Drake y de Abercromby quisieron apoderarse la isla.

Fray Iñigo, nuestro ilustre historiador en el pasado siglo, habla de calenturas pestilentes qué solian estenderse por toda la provincia.

Fuertes epidemias ocurrieron algunos años despues de establecidas las primeras ciudades en las islas y en el continente, invadiendo á la vez las armadas de los distintos paises que esploraban estas tierras.

Con las grandes aglomeraciones humanas y la falta de policía sanitaria, vinieron los estragos del tifus icterodes más terribles, cuando la higiene urbana y la naval estaban en su infancia; pero tambien en nuestros días por la indiferencia con que se miran los medios de conservar la salud de las poblaciones.

Opinaba el sabio médico inglés, Lind: que la disolución de la sangre, el vómito negro y demás síntomas característicos del tifus icterodes son accidentes comunes á las demás fiebres de esta zona; y transcurrieron muchos años con repetidos estudios patológicos para sacar de entre otras pirexias tropicales la singular variedad amarilla, presentada como entidad nosológica ó distinta de los procesos febriles palúdicos.

ETIOLOGÍA.

Elige las poblaciones situadas en el litoral sobre terrenos de aluvión, porosos, húmedos y en malas condiciones higiénicas, aunque en estos últimos años hemos visto invadidos pueblos de la zona del interior, segun dicen por importación de la costa y sin tener en cuenta su pésimo estado sanitario.

En todas partes notables faltas de higiene pública precedieron al desarrollo de las epidemias.

Los lugares cerrados y sin limpieza como los cuarteles, cárceles, hospicios es donde primero estalla la afección.

En los momentos que escribimos han tenido que trasladarse las tropas de guarnición en Ponce, al pueblo de Adjuntas, porque en el cuartel militar de la primera ciudad se presentaban diariamente casos de vómito.

Lo mismo pasa en la capital de San Juan, con sus vetustos edificios públicos, murallas y castillos, encerrando un estrecho y muy poblado recinto en las peores condiciones sanitarias, con brotes anuales de vómito negro que castigan la población no aclimatada.

En 1884 entre otras personas visibles (el 31 del mes de julio) falleció tras breves días de enfermedad con vómitos de sangre característicos el gobernador de la isla, Marqués de la Vega Inclán.

Además de las malas condiciones higiénicas, favorecen la invasión del mal; el miedo, la nostalgia, las fatigas corporales, los enfriamientos repentinos y los excesos de todo género.

EPIDEMIAS.

Hay años que pueden llamarse epidémicos como si además de las causas atmosféricas, terrestres é higiénicas conocidas, existiesen otras generales y más poderosas.

En 1885, fueron invadidas casi todas las poblaciones del litoral y hasta Cayey punto del interior.

Influye mucho en las manifestaciones epidémicas el aumento de población en condiciones de receptividad que son los muy jóvenes y los estrangeros recien llegados; y por eso mientras que en las ciudades populosas las epidemias se presentan cada cinco ó diez años; en las pequeñas transcurren á veces cuatro ó más quinquenios.

Y es lo que se ha observado en esta población. Los vecinos más antiguos refieren que en 1867 reinó una calentura maligna con vómitos de sangre, muriendo muchas personas y entre otras marineros de un buque norte americano surto en este puerto, propagándose la enfermedad á Yabucoa donde hizo numerosas muertes, sin que hasta 1885 volviera á verse una epidemia igual, y de la que dimos cuenta en un folleto publicado en 31 de enero del mismo año.

Las circunstancias porque atravesaba esta localidad eran en estremo anormales.

Corria el mes de mayo, con soles muy fuertes, 40°, 41°, y solo se presentaban de vez en cuando ligeros aguaceros * insuficientes para refrescar la atmósfera, echándose de menos las descargas eléctricas de otros años.

Los pozos, el rio y arroyos habian bajado á un nivel nunca visto.

El suelo aluvial, con capas silíceo-ferruginosas por desintegración granítica, calentado á su máximum por los rayos de un sol ardiente afectaba la vida en general.

Los vegetales estaban marchitos, secos y á lo que contribuían los vientos cálidos y sofocantes del sud, perturbadores eternos de todos los organismos en estos climas.

A estas condiciones meteorológicas y telúricas estraordinarias, juntábanse notorias faltas de higiene pública y miseria en las familias pobres.

Las fiebres intermitentes y remitentes no cedian como otros años á la quinina.

En los primeros dias del mes de junio, hubo dos niños afectados de fiebre continua con vómitos de sangre, estendiéndose poco á poco el mal entre los más jóvenes naturales del pais, blancos, mulatos, negros y los pocos peninsulares recien llegados terminando la epidemia á fines del mes de julio despues de recia lluvia.

INMUNIDAD.

Bastante se ha escrito respecto á la inmunidad de que gozan los individuos de raza etiópica; pero en nuestro concepto no son solo los caracteres antropológicos y otros factores contribuyen á la exención.

Los Africanos no eran estraños á la meteorología de esta isla, y siempre espuestos á las rudas tareas agrícolas y á las influencias mas dañosas, legaron á sus descendientes modificaciones orgánico-funcionales propias para luchar con ventaja contra los agentes deletereos y atmosferológicos, por lo que resisten mejor que los criollos blancos las fatigas corporales y la intemperie.

Pero no bastan los privilegios fisiológicos por herencia y el hábito para estar completamente al abrigo de los ataques de la fiebre amarilla, pues hemos visto que en el fuerte de las epidemias con los blancos y mulatos, caen algunos representantes de la raza negra pura.

Los oriundos africanos poseedores de una constitución férrea y de larga vida casi ya no existen.

La inmunidad absoluta para todas las razas se adquiere por manifestaciones febriles más ó menos intensas, ó por la prolongada residencia en las poblaciones de la costa, como si digeramos la tifización lenta de la economía.

Los que viven en el interior de la isla están muy espuestos á contraer la enfer-

* Solo cayeron aquel año 54.22 pulgadas de agua contra 112.18, 93.96, 92.73 en los tres años anteriores. Estas últimas cifras son aquí los normales.

medad si visitan los pueblos contagiados del litoral; y los niños deben considerarse lo mismo que si fueran estrangeros.

Por datos recogidos en varios puntos parece resultar que una calentura tifoidea preserva de la amarilla; pero nuevas y repetidas observaciones serían necesarias para admitir este nuevo elemento de protección.

Si los cambios intraorgánicos y la composición de los sólidos y líquidos varía con los individuos la receptividad para los agentes infecciosos no podrá ser siempre igual.

Hay personas refractarias á este morbo; y lo que puede atribuirse á la elaboración en su organismo de productos antizimóticos, ó al privilegio de eliminar con estraordinaria rapidez por todos los emuntorios los agentes piretogenos.

Por cuanto se ha dicho veremos existe una inmunidad natural conferida por la raza, la herencia y la naturaleza siendo los medios de protección de nuestra economía (segun los conocimientos modernos) el estado bactericida, el fagocitismo, insensibilidad á las toxinas y destrucción de las mismas.

Tenemos además la inmunidad resultante de una infección anterior que impide la vuelta del mal; y los ensayos de las vacunas preventivas, que aunque sin resultados hasta hoy señalan sinembargo un sendero lleno de esperanzas.

DIAGNÓSTICO.

Invasión brusca, forma continua, vómitos repetidos y de sangre, albumina en la orina, melena, fenómenos ataxo-adinámicos y uremia son síntomas que no se observan en ninguna otra fiebre de esta isla.

CONTAGIO.

Por más que se citan casos de personas contagiadas por enfermos de vómito, hemos visto (durante la epidemia de 1885) campesinos contagiados en la población que pasaron la fiebre en sus casas rodeados de varias personas sin propagarse la afección en aquellas alturas de lo que se desprende que los germenes febrígenos sea de la naturaleza que fueren necesitan para su multiplicación y para desarrollar su virulencia medios naturales y especiales de cultivo que se encuentran solo en los centros de población faltos de higiene.

NATURALEZA DE LA FIEBRE.

A pesar de las repetidas investigaciones bacteriológicas en varios puntos, no se ha podido aun encontrar el microbio patogeno; pero por algunos de estos micro-organismos presentes en el estómago se supone ser una afección local de dicha viscera, segregando en ella los microbios una toxina que pasa al torrente circulatorio, licua la sangre disminuye la secreción renal, produce nauseas, vómitos y constipación.

Hace ya tiempo admitiamos, fundados en nuestras propias observaciones, que la temible endemia podia desarrollarse espontáneamente en esta tórrida región en medio de circunstancias meteorológicas, telúricas é higienicas estraordinarias, capaces de trastornar todos los aparatos de nuestra fábrica, con el acúmulo en la sangre de productos retrógrados y la auto-intoxicación consiguiente.

Es una hipótesis como la anterior pues en definitiva la presencia de microbios en el estómago no implica sean estos el origen del padecimiento; pero son tantos los datos en favor del parasitismo, que la opinión se inclina cada vez mas en favor de esta teoría y hasta se han formulado tratamientos de acuerdo. Sucede lo que con la fiebre tifoidea. No hay un práctico que en los meses de julio á octubre deje de haber visto algunos casos que no se esplican por el contagio, infección del agua, etc., con todo siempre creemos y buscamos por todas partes el bacilo tífico.

FORMAS DE LA FIEBRE.

Es inflamatoria en los individuos de buena constitución, sobre todo recien llegados de Europa y los Estados Unidos.

En los criollos debilitados se manifiesta la adinamia desde el principio.

Hay casos benignos que se terminan favorablemente del tercer al cuarto dia y otros ataxoadinámicos malignos, estinguiéndose la vida en pocas horas.

La buena ó mala constitución del sugeto influyen mucho en esas diferencias de forma.

La fiebre se presenta algunas veces al principio intermitente pero rebelde á la quinina y sigue su tipo continuo.

SÍNTOMAS.

Principia generalmente por escalofrio y hay marcada raquialgia, cefalalgia frontal y dolores articulares.

Dolor al epigastrio, nauseas y vómitos repetidos con estrias de sangre, constipación, albumina en la orina constante, hemorragias por las encias, intestinos, vulva y utero, gastrorragia, anuria y fenómenos urémicos de mal presagio.

La fiebre dura tres ó cuatro dias, presenta una ligera remisión y sigue su marcha presentando á veces síntomas tíficos.

La temperatura unas veces alta 40°, 41° y otras 38°, 39°. Depende de la forma y de la constitución del individuo.

Es casi imposible para un médico de estos paises confundir esta con ninguna otra pirexia.

ANATOMÍA PATOLÓGICA.

En pequeñas poblaciones son difíciles aquí los examenes post-mortem; pero en algunos muertos á los 8 ó 10 dias de enfermedad hemos encontrado la mucosa gastrica inflamada particularmente cerca del orificio exofágico con puntos hemorragicos y pequeñas equimosis negruscas y lo que esplica los vómitos pertinaces y las nauseas como si se tratara de una gastritis aguda.

Con la prolongación de la fiebre se acentuan las alteraciones gástricas siendo casi seguro que en los casos de muerte rápida será tál vez una flogosis ligera la principal lesión.

En un caso con estado tífico pronunciado encontramos en el duodeno é ileum limitadas congestiones é inflamaciones de la mucosa y en los folículos intestinales diminutos gránulos con alteraciones de las placas de Peyero.

El estómago é intestinos siempre contienen sangre alterada.

Riñones congestionados, presentando como el hígado y el corazón la degeneración grasosa.

TRATAMIENTO.

Mientras no contemos con remedios expecíficos que impidan la marcha de los procesos febriles y á lo que tiende hoy la ciencia, la medicación de los síntomas es nuestro único recurso.

(1) Rebajar la hipertermia hasta límites compatibles con las vida, oponiéndonos á los descensos anormales de temperatura hasta la evolución de la fiebre.

(2) Combatir pronto las localizaciones de la pirexia y en algunos casos la atonía cardiaca desde el principio.

(3) Promover desde las primeras horas las secreciones intestinales cuanto lo permitan las fuerzas del enfermo para eliminar de la sangre y entrañas los productos escrementicios venenosos de la desintegración orgánica y los fermentos ó microorganismos exóticos con sus toxinas.

(4) Mantener en estado fisiológico la secreción renal que separa pronto de nuestra fábrica sustancias tóxicas *leucomainas* y *ptomainas* con los principios infecciosos del esterior.

(5) Estimular la secreción del sudor promoviendo diaforesis oportunas, medio que emplea á veces la naturaleza para librarse del padecimiento y arrojar fuera los desechos orgánicos nocivos.

(6) Hacer la antisepsia del tuvo intestinal eligiendo aquellos medicamentos que menos puedan irritar la mucosa gástrica.

(7) Combatir la adinamia, el estado tífico y la discrasia.

(8) Régimen refrigerante para aliviar el gastricismo y activar la diuresis.

Con estas indicaciones debemos tener presente las modalidades de la dolencia que bajo el punto de vista terapéutico pueden dividirse.

(1) En casos benignos que se curan con simples remedios ó por las solas fuerzas de la naturaleza.

(2) Graves en los que se necesita andar pronto, con remediós apropiados á cada caso siendo á veces inútiles todos nuestros esfuerzos.

(3) Casos de intoxicación rápida que no dan tiempo para la acción de los medicamentos.

El éxito del tratamiento depende de la prontitud con que se llenen las indicaciones, pues transcurridas muchas horas ya el daño constitucional esta hecho.

En los caquécticos, sifilíticos y cuantos padecen afecciones crónicas los mejores remedios no dan resultados y el enfermo marcha á la disolución y la muerte.

La ignorancia, la intemperie y la miseria anulan con frecuencia las prescripciones facultativas. El aire puro, el aseo en la cama y el silencio más absoluto son en esta, como en todos los tifos, requisitos esenciales. Siempre que se pueda es importantisimo la traslación inmediata del enfermo fuera del lugar infestado, y lo que influye muchísimo en el caracter y terminación favorable de la calentura.

HIGIENE INDIVIDUAL.

No cometer abusos de ningun género, evitar el sereno y los enfriamientos repentinos, mantener el vientre libre con el uso de bebidas laxantes; naranjas dulces, bicarbonato de soda y aguas minerales purgantes. Si hay debilidad nerviosa tomar 6 ú 8 granos de quinina al acostarse. Los no aclimatados deben inmediatamente abandonar el lugar contagiado.

HIGIENE PÚBLICA.

Al ocuparnos de la etiología hemos visto las malas influencias atmosferológicas que preceden á las epidemias y si contra estas toda la previsión humana es inútil no así respecto á las malas condiciones sanitarias y el malestar de las clases pobres en lo que la administración de los pueblos puede intervenir eficazmente.

De pocos años á esta parte muchos centros de población aun algunos alejados de la costa han sufrido fuerte invasiones del vómito negro y en todas aquellas consta la falta de medidas preservativas siendo indispensable que los municipios establezcan un servicio sanitario permanente con disposiciones rigurosas para llevar á cabo el saneamiento urbano.

Y por eso celebramos que en este primer Congreso Médico Pan-Americano ocupe un primer puesto la higiene general, de cuyas provechosas enseñanzas resultarán medidas eficaces para borrar de nuestra carta medico-geográfica el punto azul enemigo de las relaciones sociales y mercantiles con el esterior, alejando de nuestras hospitalarias playas brazos ó inteligencias necesarias, para la prosperidad y bienestar de esta isla.

PARÁSITOS INTESTINALES OBSERVADOS EN LOS NIÑOS EN LA ISLA DE PUERTO RICO.

Por el Dr. ANTONIO JOSÉ AMADEO,
De la Universidad de Pensilvania, Miembro del real Colegio de Cirujanos de Inglaterra, etc.

El ascarida lumbricoide, el oxiuride y la tenia son los entozoarios que con más frecuencia se observan en los niños, y de los que trataremos en este artículo.

NEMATOIDEOS.

Lombrices.—Su historia ha sido hecha por varios autores quedando aun puntos obscuros sobre la vida de estos prolíferos helmíntidos, cuyos huevos se introducen en nuestra economia con el agua, las sustancias vegetales crudas y las carnes y pescados mal cocidos de que se alimentan algunos.

ETIOLOGÍA.

Encuéntranse aquí reunidas todas las condiciones favorables para el desarrollo y propagación de los ascarideos: Suelo húmedo y cálido; lluvias torrenciales frecuentes, que arrastran sus huevos á las corrientes y pozos de agua potables; pobreza, mala alimentación y el consorcio de varios animales con el hombre; predominancia de los temperamentos linfáticos.

La infancia es la edad predilecta; pero tambien sufren los adultos, siendo más comunes en las mugeres que en los hombres, y como decia J. Frank es en la época de la luna nueva cuando se revuelven y salen al esterior.

PATOLOGÍA.

Su albergue habitual son los intestinos delgados, trasladándose algunas veces al estómago é intestino grueso, donde molestan y son pronto espulsados.

La entrada de uno de estos parásitos en la laringe puede ocasionar accesos violentos de tós, sofocación y hasta la asfixia.

En autopsias médico-legales hemos encontrado lombrices en los conductos biliares y cavidad peritoneal, penetrando tal vez despues de la muerte.

De su entrada en el hígado, pleura y vias renales hay ejemplos en varios museos de anatomia patológica.

En un niño muerto con convulsiones, timpanitis y arrojando por la boca lombrices al examen post-mortem verificado seguido, encontramos perforación de los intestinos delgados y peritonitis localizada con la presencia de los parásitos causantes.

La sustancia grasa irritante contenida en las vesículas de las fibras musculares de este helmintido puede determinar una enteritis grave.

Vómitos con estrias de sangre y diarreas sanguinolentas deben atribuirse á la misma causa.

SÍNTOMAS.

Vientre tenso, flatos, cólicos intestinales, diarrea, ojeras, prurito nasal, rostro demacrado, acidez de la boca, tós seca, salivación, sudores frios, palpitaciones, vértigos, pesadilla, rechinamiento de dientes durante el sueño, enflaquecimiento y dolores en varias partes.

No todos estos signos se encuentran reunidos; pero algunos no faltan siendo el más seguro (y que rara vez se hace esperar) la espulsión de lombrices, cuyos huevecillos se reconocen con el microscopio en las materias fecales.

CONSECUENCIAS.

Los médicos antiguos exageraron la influencia patológica de las ascaridas, pero en nuestros dias (respecto á este país al menos) se ha caido en el estremo opuesto.

Convulsiones histéricas, tetánicas y epileptiformes, que alarman las familias, dispepsia, enteritis, peritonitis, paralisis, trastornos pasageros de la inteligencia,

anemia, y cólicos con vómitos y diarrea, son con frecuencia padecimientos debidos á las lombrices.

Hace poco hemos visto una jóven de 18 años, con fuerte dolor, diarrea, vómitos y estado algido (simulando un ataque de cólera nostras ó una perniciosa) cuyos síntomas desaparecieron con la espulsión de centenares de lombrices, despues de la administración de un purgante de calomel seguido de otro de aceite de ricino.

Los autores modernos sobre las enfermedades de los niños no hablan de la fiebre verminosa, cuya existencia no puede aquí negarse (sobre todo durante la primavera), habiéndola considerado de origen paládico siguiendo la doctrina etiológica esclusiva de la malaria, remora constante para la mejor clasificación nosológica de nuestras dolencias.

El número á veces considerable de estos entozoarios en el tuvo digestivo, su muerte, descomposición, y la sustancia grasa irritante contenida en sus fibras musculares, forman un detritus para la auto-infección del organismo y fiebre continua con exacerbaciones diarias, temperatura 38°, 39°, 40° centigrado, somnolencia, movimientos convulsivos, rechinamiento de dientes, ojeras pronunciadas, estrabismo, aliento acido, lengua sabural, flatos, nauseas, vómitos con estrias de sangre, vientre tenso dolorido, diarrea á veces sanguinolenta muy fétida, conteniendo fragmentos de lombrices y salida de estas por la boca y el ano; tós seca, hipo, sudores frios parciales, dolores en varias partes, pupilas dilatadas, pero no siempre.

El movimiento febril dura de siete á nueve dias, mostrándose rebelde á la quinina, y se combate ventajosamente con los antielmínticos, el calomel á dosis purgantes y el aceite de ricino, que echan fuera infinidad de dichos parásitos.

Cuando en medio de la calentura se desarrolla un acceso eclámptico y muere la criatura, se piensa en una perniciosa palúdica por mas que se halla administrado la quinina desde el principio y hasta con esceso.

El paludismo ha hecho olvidar las demás causas de enfermedad.

Pero el ascaride lumbricoides no se aloja solo en los intestinos del hombre, sino que tambien elige el de los animales, sobretodo de raza bovina, pues el año pasado vimos en una estancia considerable número de becerros atacados de diarrea sanguinolenta (enteritis), muchos de los que sucumbieron y abierta por mi órden la cavidad abdominal, encontré: pelotones, millares de estos vermes en los intestinos, inyección general de la mucosa, errosiones y perforaciones multiples con la particularidad de que durante el mal, no se vió al esterior una sola lombriz.

OXIURIDE VERMICULAR.

Este otro diminuto nematoides se observa en los adultos, pero es mucho más común en la infancia.

Sus huevos entran al sistema con los alimentos y el agua lo mismo que los de las lombrices y su vida principia en el duodeno para terminarse en el ciego, donde permanece, emigrando al recto, ano, vagina y uretra con inflamación de estas mucosas y secreciones mórbidas.

Los pequeños enfermos estan siempre nerviosos, lloran, se rascan el ano y las niñas, la vulva inclinándolas al onanismo.

Se presenta un eritema en el repliegue genito crural; las criaturas no duermen se ponen pálidas, flacas y hasta sufren convulsiones y fiebres.

Es un tormento para las madres, particularmente de noche. Hay dispepsia, falta de apetito y diarrea con espulsión de centenares de estos animalillos, causa de un prurito insoportable.

Las lavativas aloéticas y terebentinadas, los supositorios de unguento mercurial, la santonina, el calomel y los purgantes son buenos remedios contra el padecimiento.

CESTOIDEOS.

Tenia.—Se ha dicho que las solitarias son muy raras en los niños, pero hemos visto aquí varios casos en particular de *tenia inerme* y lo que puede atribuirse al uso de la

carne de res casi cruda, aunque algunos helmintólogos opinan que los huevos del animal pueden llegar al organismo humano, por medio del agua estancada y de los vegetales sucios y crudos.

Los niños pobres que viven en las peores condiciones higiénicas son los más espuestos, por más que hace pocos meses, he estraido una, en un niño rico de cinco años de edad, cuyo padre, aleman, había tenido también la tenia en su juventud en Hamburgo.

SÍNTOMAS.

Palidez del semblante, anemia, ojeras, enflaquecimiento, dilatación de la pupila, trastornos visuales, apetito voraz, otras veces anorexia, cólicos intestinales, diarrea, prurito anal y nasal; el niño está siempre irritable nervioso con sudores frios vértigos y algunas veces convulsiones epileptiformes; pero todos estos síntomas pueden presentarse sin que haya solitaria siendo el único signo seguro positivo encontrar, en las evacuaciones uno ó varios anillos del parásito, lo que siempre tiene lugar espontaneamente ó despues de un purgante.

Hay charlatanes que se titulan helmintólogos y han recorrido la isla, propalando diagnosticar la tenia con solo ver y examinar al individuo, impresionando y esplotando á los débiles é ignorantes; pero, como ya dijimos y repetiremos, el único síntoma ó signo seguro de su existencia son los fragmentos espelidos.

TRATAMIENTO.

Varios son los tenifugos recomendados y todos los hemos empleado, sin que pueda compararse ninguno al extracto etereo de helecho macho.

Dos escrúpulos ó más (segun la edad del niño) en ayunas, seguido una hora despues de un purgante de aceite de ricino bastan para espulsar la tenia entera, y rara vez hay que repetir la dosis.

La mejor profilaxis consiste en vivir rodeado de las mejores condiciones sanitarias, beber buena agua corriente filtrada y comer las carnes, legumbres y pescados bien cocidos.

Los niños que aquí abusan de las frutas; mangos, plátanos amarillos, etc., están llenos de lombrices.

CAUSAS QUE SOSTIENEN LA ENDEMICIDAD DE LA FIEBRE AMARILLA EN LA HABANA.

Por el Dr. ENRIQUE ACOSTA,

Profesor del Laboratorio Bacteriológico de la Crónica Médico-Quirúrgica.

I.

El estudio de la fiebre amarilla, enfermedad desastrosa que ha ocasionado tantas víctimas, ha preocupado siempre la atención de los hombres de ciencias de todas las naciones. La anatomía patológica, la histología, la clínica, la terapéutica y la bacteriología han sido puestas á contribución de una manera sorprendente á fin de esclarecer problema de tan trascendental importancia; inútil hasta ahora han sido los esfuerzos de todos los que tras larga série de innumerables estudios, han tratado de buscar la causa ó el agente productor de tan terrible azote. Y no por eso han desmayado en su empeño los que tal propósito concibieron, pues que á pesar de lo difícil de la empresa, aún le consagran con ferviente devoción su tiempo é inteligencia; por eso nos merecen verdadero respeto los nombres de Sternberg, Freire, Carmona, Finlay, Delgado y Tamayo.

No vamos á divagar remontándonos á épocas lejanas para señalar las causas que á nuestro juicio hacen de la isla de Cuba uno de los focos mas temibles de esta enfer-

medad; empresa inútil sería, porque ahora como entónces existen las mismas causas y poco se ha hecho para evitarlas.

De modo que el estado de nuestra población actual, poco mejorado en sus condiciones higiénicas nos servirá para el objeto que nos proponemos.

Mientras que la bacteriología no invadió el campo de la medicina ningún estudio de verdadera importancia se habia hecho en favor de la etiología de la fiebre amarilla, porque si es verdad que algunas ramas de las ciencias médicas han contribuido á esclarecer la marcha, síntomas, diagnóstico, pronóstico y tratamiento de esta enfermedad, la etiología siempre quedó, no postergada, pero si oscurecida ante la dificultad de su estudio.

A la bacteriología, que tanto ha ensanchado los límites de la medicina y ciencias auxiliares estaba reservada el progreso etiológico de la fiebre amarilla, por eso la humanidad agradecida tiene que admirar siempre los nombres ilustres de Pasteur, Koch, Sternberg, Roux y otros.

II.

Hasta el año 1879 ningún estudio serio se había intentado en la isla de Cuba acerca de la etiología de la fiebre amarilla, el primero corresponde al Consejo Nacional de Sanidad de los Estados Unidos, que en 25 de setiembre acordó nombrar una comisión que trasladándose á esta ciudad, fijase:

(1) La condición sanitaria de los puertos cubanos que tienen más estrechas relaciones comerciales con los Estados Unidos y especialmente los de la Habana y Matanzas;

(2) Aumentar los conocimientos adquiridos sobre la patología de la fiebre amarilla, y

(3) Estudiar la endemicidad de dicha fiebre y sus causas.

Esta ilustrada comisión á pesar de los estudios importantes y completos que realizó, no pudo determinar como hubiera deseado el factor desconocido que buscaba, no obstante inició trabajos trascendentales que aún conservan todo su valor.

Posteriormente los Dres. Carlos Finlay y C. Delgado han dedicado su atención al estudio de esta enfermedad y dado á conocer trabajos de verdadero mérito que enumeramos* porque entendemos que han prestado verdadero servicio al estudio de la fiebre amarilla y nos complacemos también en consignarlo, porque han sido los primeros que en nuestro país han hecho estudios bacteriológicos y experimentales de la afección que nos ocupa aún cuando sus resultados á favor de la etiología hayan sido negativos.

Lo mismo podemos decir de las profundas investigaciones realizadas en la Habana por los Dres. Sternberg, Tamayo, Gibier y Moreno.

El primero de estos investigadores—el Dr. Sternberg—que á nuestro juicio es el que más estudios ha hecho acerca de la fiebre amarilla y que desde 1879 se ha ocupado tenazmente de esta afección, en su última obra (Report on the Etiology and Prevention of Yellow Fever) consigna en el nono capítulo, entre otras, las dos conclusiones siguientes:

Segunda. Habiendo resultado negativas las investigaciones practicadas en la sangre y los tejidos, parece probable que el microbio se encuentre en el tubo digestivo como sucede en el cólera.

* * * * * * *

Quinta. De los hechos expuestos parece deduciore que las deyecciones de los atacados de fiebre amarilla deben considerarse agentes infecciosos siendo indispensable por tanto su desinfección antes de anojarlas á las letrinas.

El Dr. Tamayo, después de numerosas investigaciones realizadas en el laboratorio bacteriológico de la Crónica Médico-Quirúrgica de esta ciudad, dió á conocer el resultado de ellas demostrando que nada había encontrado en la sangre, orines, vómitos negros, piel y aire y que sus posteriores investigaciones se dirigirían al tubo digestivo porque le parecía que esta vía sería más fecunda en resultados.

* Véase al final.

El Dr. Paul Gibier estudía la sangre, orines, tejídos, etc., y nada encuentra pero se detiene en la materia negra vomitada y dirige sus investigaciones á ella y al contenido estomacal, con resultados negativos á pesar de su entusiasmo por haber aislado del contenido intestinal un organismo microscópico melanógeno.

El Dr. Moreno, emprende una serie de investigaciones para averiguar si existe un veneno amarillo como existe uno colérico, tetánico ó diftérico y se libra á serias experiencias con resultados negativos.

Nosotros, en unión de nuestro compañero del laboratorio, el Dr. F. Grande Rossi, nos ocupamos de la fiebre amarilla y hemos iniciado dos trabajos que aún no están terminados: el análisis del aire, agua y fango de la Bahía de la Habana y inoculaciones en el cerebro debajo de la dura madre, de caldo esterilizado en el que se emulsiona vísceras de cadáveres de fiebre amarilla.

Del primero, podemos consignar los datos siguientos:

Análisis del aire.

	Bacterias por c. c.
(1) Análisis del aire * recogido frente á Casa Blanca	175,500
(2) Análisis del aire † recogido frente á Belot	501,110
(3) Análisis del aire ‡ recogido frente al Rio Matadero	707,240
(4) Análisis del aire § recogido frente al Hospital Militar	433,898

ANÁLISIS DEL AGUA.

Agua recogida por un buzo en vehículos apropiados á dos varas de profundidad en los mismos sitios en que se hizo el análisis del aire.

	Bacterias por c. c.
Agua recogida frente á Casa Blanca	2,401
Agua recogida frente á Belot	24,493
Agua recogida frente al Rio del Matadero	27,402
Agua recogida frente al Hospital Militar	25,611

Del fango recogido en el fondo de la bahía nos proponemos hacer un análisis no solo cuantitativo sino cualitativo.

El segundo estudio comprende las inoculaciones practicadas en el cerebro de varios conejos con producto de dos autopsias.

PRIMERA AUTOPSIA.

Enfermo de fiebre amarilla que muere en el Hospital Militar á las 6 de la mañana del dia 11 de setiembre de 1892, y al que practicamos dos horas después la autopsia.

Productos recogidos.—Un pedazo de hígado, otro de masa cerebral, riñón y bazo; se coloca todo en un pomo esterilizado é inmediatamente se lleva al laboratorio.

De la parte central de los productos recogidos se separan pequeños fragmentos que se trituran en una copa con caldo esterilizado según el procedimiento empleado para el vírus rábico.

Se escogen tres conejos:

Primero: De color blanco y negro de 3 libras 7½ onzas de peso, se le inocula por trepanación el líquido preparado con el cerebro; temperatura antes de la trepanación, 39.1°.

Segundo: Conejo color *rosillo* de 3 libras 11 onzas; por trepanación se le inyectan en el cerebro dos gotas de líquido preparado con hígado; temperatura, 39°.

Tercero: Conejo color blanco de 2 libras 8 onzas; se le trepana é inyecta el líquido preparado con riñón; temperatura, 38.5°.

Por la tarde la temperatura era la misma en los conejos primero y tercero; el número dos, rosillo, tenía 40° y estaba triste, la respiración anhelosa; palpitante, no comió.

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* Lugar próximo á la entrada del puerto.

† Lugar próximo á la desembocadura del Rio del Matadero.

‡ Este rio lleva á la bahia los desperdicios del Matadero.

§ Las excretas de este hospital se pierden en la bahia.

Setiembre 12 por la mañana.—El conejo número dos continúa con 40° de temperatura, triste, sin comer y nos sorprende que la jaula estaba limpia de orines. Para observar este hecho encerramos al conejo en una caja de zinc con pequeñas aberturas laterales y superiores y provista de un tubo de salida en el fondo con declive á fin de que si orinaba tuvieran que salir éstos por dicha abertura. Como la caja estaba suspendida por cuatro patas de madera, nos permitió colocar una cristalizadora debajo del tubo para recojer los orines. Por las aberturas laterales le colocabamos la comida.

A las 3 de la tarde la temperatura seguía subiendo 40.3° y aún no había orinado.

Setiembre 13 por la mañana.—Temperatura, 39.6°; respiración más tranquila, ha comido poco, no orina. Por la tarde orina 15 gramos de orina y durante la noche 20.

Setiembre 14.—Temperatura 39°, desaparece la tristeza de los dias anteriores y orina abundantemente á nuestra presencia.

El análisis de los orines no demostró la presencia de la albúmina. Su peso era de 3 libras y 8 onzas, de modo que había perdido 3 onzas de peso.

Setiembre 15.—Se encuentra perfectamente así como los otros dos que observados cuidadosamente no presentaron síntomas que llamasen la atención.

SEGUNDA AUTOPSIA.

Enfermo de fiebre amarilla; muere á las 6 de la mañana; tres horas después recogimos hígado, bazo y riñón con los que inoculamos varios conejos, aumentando la inyección al que se inocula con hígado.

Ninguno de estos conejos tuvo novedad, pero el inoculado con hígado acusó reacción febril y disminución de la secreción urinaria.

De todo lo expuesto se deduce que ninguno de los trabajos realizados hasta el presente han dilucidado el problema etiológico de la fiebre amarilla, pero en cambio podemos asegurar, que ellos han limitado las numerosas vias de estudios que se presentan al investigador y que la bacteriología llegará en no lejano tiempo á realizar la más brillante y humanitaria de sus conquistas.

III.

CAUSAS QUE SOSTIENEN LA ENDEMICIDAD DE LA FIEBRE AMARILLA EN LA HABANA.

Las calles.—Las calles de la Habana son por lo general estrechas; en sus dos terceras partes carecen de adoquines y de acera; las adoquinadas presentan desigualdades frecuentes y las que no lo están numerosos baches, que con las aguas pluviales ó las arrojadas de las viviendas, constituyen pequeños ó grandes depósitos de agua que al sufrir la descomposición natural, se transforman en verdaderos focos de infección.

No se riegan jamás y cuando un lijero aguacero se encarga de este servicio, el fango predomina convirtiéndose después en polvo que nuestras casas, muebles, vestidos y pulmones tienen que recoger.

El barrido se hace con la recojida de las basuras empezando á las 10 de la noche; sumamente imperfecto, no es extraño contemplar por las mañanas, al frente de muchas casas, restos de las basuras depositadas la noche anterior y en muchas calles animales muertos que han escapado á la indiferente vigilancia de los barrenderos.

Los caños, desagüe de las aguas pluviales, generalmente tienen salida en las aceras, lo que obliga al transeunte en tiempo de lluvia á caminar por el centro de las calles, antes que verse acometido de trecho en trecho por un potente chorro de agua que moja sus piernas.

Las casas en su mayor parte son chicas y de planta baja, muchas de dos pisos y las menos de tres y cuatro. Su distribución interior muy defectuosa, en casi todas las chicas, pues el servicio de cocina, pozo negro y caballeriza se encuentran en un mismo departamento, carecen de habitaciones para criados. Las menos tienen acometimiento á la cloaca, las más vierten sus aguas en el pozo negro.

Letrinas.—La Habana posee 17,000 casas próximamente; en la mayor parte de ellas se emplea la fosa fija en las restantes, acometimiento á la cloaca. El sistema de

limpieza de estas fosas es de lo más primitivo y detestable. Una carreta con tres grandes pipas se sitúa al frente de la casa; los excrementos, que por medio de cubos se sacan de la fosa son llevados por dos empleados hasta la puerta de la calle donde está la carreta, allí se vierten en las pipas hasta llenarlas.

Pocas veces se hace la limpieza completa, el dueño de la casa, para satisfacer el deseo de su inquilino se limita á extraer tres ó seis pipas; regularmente queda la fosa con bastante escremento.

Este servicio se hace á las 11 de la noche, hora en que casi toda la población está despierta y se vé obligada, bien á cerrar sus puertas, bien á tropezar en su camino con el asqueroso espectáculo de este servicio.

El ingeniero militar, Sr. D. Arturo Amigó, en una bien escrita memoria leida en la Sociedad de Higiene de la Habana, al hablar de las fosas, dice:

Para saber la cantidad de inmundicias que por término medio debe haber en un momento dado, en todas las letrinas de la ciudad, bastará hacer el siguiente cálculo: Teniendo la población 17,000 casas, corresponde á cada una 11.79 habitantes y supongamos, para más facilidad, iguales todas las letrinas. Limpiándose estas tres veces por año* tendremos que cada letrina ha de tener la cabida necesaria para contener las dos toneladas que depositaran cada cuatro meses los 11.79 habitantes de cada casa. Siendo estas 17,000 el número anual de las limpiezas será de 51,000, lo que dá en números redondos, 140 limpiezas diarias y no olvidemos que una letrina se limpia cada 120 dias, al cabo de las cuales contiene 2 toneladas de escrementos. Por consiguiente en un momento dado hay en la Habana:

Toneladas.

140 letrinas vacías que contendrán ..... 140×0

140 limpiadas el dia anterior que contendrán ..... $140 \times \frac{1}{120} \times 2$

140 limpiadas dos dias antes que contendrán ..... $140 \times \frac{2}{120} \times 2$

140 tres dias antes que contendrán ..... $140 \times \frac{3}{120} \times 2$

Y así hasta las 140 que se limpian 120 dias antes ..... $140 \times \frac{120}{120} \times 2$

La suma de todas estas cantidades nos dará la total que buscamos y será, haciendo omisión de la primera que es nula,

$$140 \times \frac{1}{120} \times 2 + 140 \times \frac{2}{120} \times 2 + 140 \times \frac{3}{120} \times 2 + 140 \times \frac{4}{120} \times 2 + \ldots\ldots$$

$$140 \times \frac{120}{120} \times 2 = \frac{140 \times 2}{120}(1 + 2 + 3 + 4 + \ldots\ldots 119 + 120 = 16{,}940 \text{ toneladas.}$$

Tal es la enorme cantidad de inmundicias que por término medio existe en todas las letrinas de la Habana en un momento dado. El trasporte de esta materia exigiría 56 trenes formado cada uno de 30 wagones cargados al máximum, es decir á 10,000 kilos por wagón, ocupando dicho material una longitud de línea de unos 12 kilómetros.

ABASTECIMIENTO DE AGUAS.

En los primeros setenta años de la fundación de la Habana, esta tomaba del rio Luyanó las aguas que necesitaba, de los pozos y algibes particulares y del Estado. En 1591 se construyó la Zanja Real y desde entonces á pesar de la construcción del acueducto de San Fernando que no acarreaba la suficiente cantidad, hasta el año próximo pasado una gran parte de la población ha tenido necesidad de utilizar dichas aguas; después de los trabajos de Vento mejoraron las condiciones higiénicas de la población, pues se sustituyó con el agua de Vento por más que la peor, la de la Zanja, tenia que seguirse aprovechando. Desde el año 1892 el abastecimiento del agua de Vento á la ciudad se hizo general y quedó como exclusiva á toda la población.

Pero aun no podemos recibir en absoluto su saludable influencia porque la construcción de dos grandes estanques de capacidad asombrosa, para depositarla, le hacen adquirir desventajosas propiedades.

* Hay muchísimas que nunca se limpian.

Dichos estanques carecen de techo que los resguarde de la lluvia y de muros de contención para el arrastre de las basuras próximas; están hechos al nivel del suelo, de manera que al depositarse en ellos las aguas para su distribución en la ciudad pierden sus condiciones de pureza como se desprende del siguiente análisis practicado por nosotros:

Agua recogida en el manantial	gérmenes por centímetro cúbico	157.
Agua recogida á la entrada del tunel	do	227.
Agua recogida á la salida del tunel	do	809.
Agua recogida en la primer represa	do	2.063
Agua recogida en la segunda represa	do	2.651
Cantidad de materia orgánica	por litro	0.010
Análisis del agua después de haber pasado por los depósitos, cantidad de materia orgánica	por litro	0.040

Como se vé el agua á medida que se ha ido alejando de sus manantiales ha sufrido la acción multiplicadora de sus gérmenes y materia orgánica y perdiendo por ello las condiciones que le hacían caber en la clasificación del profesor Miguel entre las primeras.

CLIMA.

Nada mas envidiable que el clima de la isla de Cuba; su brisa constante refresca, fortalece y consuela, cuando después de un dia abrasador nos entregamos al descanso. Su sol, si bien nos hace sufrir las molestias de un calor sofocante, en cambio nos evita multitud de infecciones; su acción destructora sobre los organismos microscópicos es bien conocida, pues detiene la germinación que tan peligrosa sería; por eso creemos que á él se debe en gran parte la no extraordinaria proporción de mortalidad que arrojan nuestras estadísticas á pesar de las innumerables causas que abonan en su favor.

HOSPITAL MILITAR.

Este edificio no fué construido para hospital, sino era una factoría de tabacos hasta el año 1843. Situado al sur de la ciudad en las márgenes del puerto y en un terreno bajo, su emplazamiento ofrece las peores condiciones. Ese lugar es un foco de fiebre amarilla y son numerosos los soldados que allí la han contraido; es frecuente que un soldado que acude al hospital para asistirse de una afección venérea, á los pocos dias, tiene que ocupar cama en sala de medicina para morir de fiebre amarilla. No tiene sala especial de fiebre amarilla; posee una de cirugía con 65 camas, otra para enfermedades de la piel con 20 y otra de afecciones venéreas con 60. Además 4 de medicina y las demás de marina.

La higiene de las salas es defectuosa, los pisos son malos, no hay inodoros y se emplea el antiguo sistema de vacinillas * que se limpian dos veces al dia arrojando las excretas al mar. El aseo se hace, en cuanto lo permite la mala construcción del edificio y es de "lamentar" que no posea una estufa de desinfección á baja presión como la que posee el Hospital Civil donada por el Laboratorio de la Crónica Médico-Quirúrgica.

CASAS DE SALUD.

Establecimientos destinados exclusivamenta á la asistencia de enfermos, debían reunir condiciones necesarias para su objeto toda vez que el progreso actual permite aprovechar lo que hace falta para ello, pero como ésto, debido quizás á la poca utilidad monetaria que reciben, resultan verdaderos focos de infección, sobre todo para la fiebre amarilla.

En algunas no hay sala para esta enfermedad y resultan mezclados los enfermos. Además muere uno del *rómito* y pocas horas después ocupa su cama un recien llegado que necesariamente tiene que sufrir la infección. Y esta apreciación no es nuestra, se vá generalizando de tal modo, que es corriente oirlo entre los mismos que frecuentan dichas casas.

* Revista de Ciencias Médicas de la Habana, número extraordinario, octubre de 1892.

Además puestos dichos establecimientos al servicio de las Sociedades Regionales, los que hacen uso de ellas son en mayor parte europeos españoles recien llegados ó que aún no han creado familiar y de aqui el mayor contingente para el desarrollo de la endemia.

No hay inodoros y se emplea, lo mismo que en el Hospital Militar, el servicio de vacinillas que se limpian dos veces al dia, siendo la más peligrosa la que se reserva para la noche, pues á esa hora enfermos y empleados duermen y el encargado de la limpieza penetra en la habitación con el depósito general donde vá acumulando los excrementos recogidos de cada cuarto para después verterlos en la fosa del establecimiento.

RASTROS.

Dentro del perímetro de la ciudad existen quince ó veinte de estos establecimientos insalubres que encierran puertas adentro en confusión desordenada, cuantos objetos puedan idear las industrias fabriles. Todos los departamentos estan repletos, pisos, paredes y techos de esos objetos, que en su mayor parte son usados y casi todos desvencijados y rotos. En ellos se compra y vende, desde el zapato roto hasta el mueble más lujoso, todo representa un valor y por inútil que parezca un objeto allí se vende facilmente.

Por estas causas se comprenderá sin gran trabajo, porque constituyen dichas casas un verdadero peligro. Si por el contrario estuviesen situadas fuera del casco de la población y provistas de aparatos de desinfección para los objetos pequeñas y departamentos adecuados para los grandes, serían entonces de utilidad indiscutible.

TRENES FUNERARIOS.

Este servicio ha sido y sigue siendo peligroso; los carros que conducen los cadáveres al cementerio vuelven á la ciudad sin haber sufrido la desinfección necesaria antes ni después. Recientemente se han dictado órdenes para que dichos carros sean fumigados en el cementerio, pero dicha medida perjudica á los intereses de los propietarios y creemos no se cumpla, porque las fumigaciones destruirían el decorado de los carros. Además, la ropa de los zacatecas y las alfombras y tapices que se llevan á las casas, no son desinfectadas como debían.

Pero hay que señalar aun otro hecho que es público y que constituye un peligro para la salud pública. En el cementerio se observa la costumbre de que cuando se dá sepultura á un cadaver de persona pobre se le quita el sarcófago á caja, la que es devuelta al tren funerario, sirviendo después para otro cadaver.

ALCANTARILLAS.

Poco diremos de ellas porque nuestras averiguaciones han sido infructuosas, este hecho constituye un dato importante porque demuestra que su distribución por la ciudad es desconocida, así como su repartimiento y construcción. El único dato seguro que podemos ofrecer es que solo existe una de buenas condiciones de sillería de bóveda. Las demás no valen nada y más son caños de desagüe que verdaderas alcantarillas. Se han ido construyendo á impulsos de la necesidad que han tenido los vecinos de desaguar sus casas.

RECIEN LLEGADOS (SU HIGIENE).

No sólo encuentra el recien llegado español al desembarcar en la Habana las malas condiciones que hemos enunciado, sino que las más graves son provocadas por descuido ó inobservancia de los preceptos higiénicos personales. Generalmente un 90 por ciento de los recien llegados son individuos pobres que se dedican al servicio doméstico, bien en casas particulares, bien en establecimientos; los menos en fincas, para labores del campo y ésto ultimamente; aquella ocupación constituye de por sí una causa predisponiente para contraer la fiebre amarilla porque se ven postergados

al último rincón de la casa, sin poder aprovechar ninguno de los preceptos que aconseja la higiene privada.

Todavía sufren mas este peligro, los que se colocan en bodegas, establecimientos insalubres que por desgracia abundan. En cada esquina hay una y están destinadas á la venta al pormenor de víveres, bebidas y efectos caseros.

Por lo general ocupan pequeño espacio y este hay que aprovecharlo para depositar las innumerables mercancias que se venden; las condiciones pues del local obligan á los dependientes de la casa á tener que dormir detrás del mostrador ó en oscuras y estrechas balbacoas improvisadas.

Nada diremos de los que menos favorecidos de la suerte tienen que colocarse de caballericeros, barrenderos, etc.

Además, visitan á sus compañeros enfermos de fiebre amarilla en las casas de salud y no se les ocurre el peligro á que se exponen.

Cuando los disturbios políticos de este país tenían lugar, los soldados que venían de la Península contribuían á aumentar la mortalidad de esta enfermedad y se comprende que así fuese, porque generalmente venían en verano, desembarcaban al medio dia y se les hacía caminar desde el muelle hasta el Castillo del Príncipe recorriendo una distancia de 1½ kilómetros próximamente. Posteriormente y por real orden se prohibió el embarque de la tropa en otra época que no fuesen los meses de octubre á mayo.

Enumeradas algunas de las causas que á nuestro juicio sostienen la endemicidad de la fiebre amarilla en la Habana pensamos que ningún provecho había de reportarnos el conocimiento de su origen bacteriano y aunque esto parezca un absurdo, basta pensar que el muermo (farcino, morve) apesar de ser tan bien conocido su origen, mata anualmente 20 personas, que la viruela cuando nos visita se propaga rápidamente y que el cólera si llega á nuestro puerto, no encontrará obstáculos para su fácil diseminación y desarrollo.

Por eso entendemos que sola la higiene puede evitar la endemicidad de la fiebre amarilla, destruyendo los numerosos focos que la sostienen.

Pero como esto no es obra de un día ni nuestro tesoro puede hacerle frente, aprovechamos la idea que un día lanzara el periódico de medicina La Crónica Médico-Quirúrgica de la Habana * y que posteriormente incluyó en su informe anual al Gobierno de esa República el jefe de la sanidad marítima, cuyo nombre no tenemos el honor de recordar, para someterla á la consideración ilustrada de vosotros. Decía:

Mas no es nuestro propósito insistir acerca de este hecho que salta á la vista † y es hasta vulgar de sumo conocido; otro es nuestro punto de mira, aún cuando merezcamos el calificativo de ilusionistas ú optimistas, al estampar nuestros propósitos respecto á lo que deba hacerse para evitar esas epidemias en los Estados Unidos, empezando por extinguir la enfermedad entre nosotros, pues estamos persuadidos que esto se obtendría con las poderosas armas de la higiene moderna.

No vamos á hablar de la supresión del comercio durante la mitad del año entre esta isla y las costas Norte Americanas, como se pensó después de la epidemia de 1878; tampoco nos fijaremos en las medidas de obstruccionismos á los viajeros no aclimatados, que después de todo resultan ineficaces; ni intentaremos acuerdos internacionales que siempre son poco menos que inútiles; nó, buscamos la clave de la solución del problema de la fiebre amarilla en la naturaleza de las instituciones de esa gran República, mas interesada, si cabe, que la isla de Cuba, y aún que España, en la extinción de la fiebre amarilla, porque tiene á algunas millas de su foco una población de más de 60 millones de habitantes, que en un desate asolador de esos, que han patentizado las epidemias en la historia, pueden ser amenazados como un solo hombre por la ruda segur de la muerte.

En los Estados Unidos, como hemos dicho en otra ocasión, no se espera todo de la acción tutelar del Gobierno, como sucede en otros paises; el caracter peculiar de ese pueblo es el de resolver por si sólo y sin la ayuda de los poderes del Estado, reservados para casos determinados cuantos problemas se relacionan con sus intereses individuales ó colectivos. A ese pueblo interesado en la extinción de la fiebre amarilla, lo excitamos para la creación de una sociedad que tenga por objeto escogitar los medios conducentes, no sólo á el estudio del tifus icterodes, en su natu-

* Tomo 14, pag. 488, año 1888.

† Se refiere á la epidemia de fiebre amarilla que hubo en Jacksonville en 1888 y que cree fué importada de la Habana.

raleza y medios de propagación, sino que tambien á buscar los recursos higiénicos que convenga poner en práctica mientras no s averiguase lo primero; mas como todo esto demanda grandes recursos que no podemos esperar de nuestra escasa población, ni del empobrecido país que habitamos, cumple al pueblo americano, aún más interesados que nosotros en la extinción de la fiebre amarilla, y sobrado de elementos y población, tomar la iniciativa, que á nosotros, colocados en el terreno del combate, nos tocaría aprontar nuestros servicios personales, como venimos, haciéndolo aúnque esterilmente por lo aislado, creando un laboratorio con elementos puramente particulares, y utilizando el desprendimiento de un puñado de profesores que estudian la fiebre amarilla, sin otra recompensa que la satisfacción de hacer una obra buena, de servir á la patria, y obedeciendo á la necesidad de satisfacer una noble exigencia del espíritu.

Llamada de la página quinta. Trabajos del Dr. Finlay y Dr. Delgado. Patogenia de la fiebre amarilla por el Dr. C. Finlay, 1882. Teoria patogénica de la fiebre amarilla y trasmisión por el mosquito, 1883. Apuntes sobre la historia de la fiebre amarilla, 1884. Nuevas consideraciones acerca de la historia de la fiebre amarilla, 1885. Etiologia de la fiebre amarilla en el año 1888 á 1889. Micrococo tetragenos versatiles. Estadística de las inoculaciones con mosquitos contaminados en enfermos de fiebre amarilla, 1890.

DO GERMEN ESPECIFICO DA COQUELUCHE.

Por MONCORVO FILHO,

Assistente do Laboratorio de Biologia do Estado, Chefe de Clinica do Serviço de Pediatria da Policlinica do Rio, Membro effectivo do Gremio dos Internos dos Hospitaes, Bibliothecario do mesmo Gremio, Socio fundador da Sociedade Nacional de Acclimação, etc.

Ha cerca de tres annos que estudo o germen da coqueluche sob diversos pontos de vista, tendo ja publicado sobre o assumpto alguns trabalhos e communicações.

As minhas perquisições attingiram a perto de 50 casos clinicos donde eu retirava os elementos de estudo.

Como se sabe innumeros trabalhos têm sido dado a luz da publicidade acerca do microorganismo da coqueluche; entre muitos outros tembraremos os nomes de Letzerich, Burger, Tschamer, Afanasiew, e recentemente Ritter, da Allemanha, e Galtier, da França. Estes dous ultimos autores dão a origem da coqueluche a *cocci*, que lhes foi dado entratanto verificar, em numero resumido de casos. Taes estudos porem deixam muito a desejar em relação aos practicados por meu pae, o Prof. Moncorvo, desde 1882 a 1887 e depois por mim tão longa e minuciosamente executados até a presente data.

Quanto a mim o microbio especifico da coqueluche é polymorpho; e dahi a divergencia e as contradicções dos estudos de tão notaveis investigadores como os que se têm empenhado em resolver tão seria e embaraçada questão.

Foi pois pela analyse detida de todos os factos, pelo estudo minucioso de grande numero de casos daquella affecção, que pude tirar algumas conclusões que me parecem aproximadas da verdade.

As pesquizas sobre o esputo são difficeis; e bem se o comprehende que, apezar mesmo de todas as cautelas, cuidadosa desinfecção buccal, não se póde evitar que alguns germens communs a saliva sejam acarretados.

Retirado do fundo da garganta do doente, por meio de um pincel esterilizado, um pouco de catarrho e com elle fazendo preparações simples, sem coloração verificam-se: Globulos de pus e de sangue em alguns casos mais agudos; um numero regular de cellulas epitheliaes, pavimentosas, nucleadas, infiltradas em sua maioria, de microorganismos; alem de alguns germens communs a saliva normal e mechanicamente acarretados, um elevado numero de *micrococci alongados*, raramente globulares, affectando por vezes a forma bacillar, tendo alguns um estrangulamento central, apresentando um certo brilho.

Reunem-se em cadeias, em grupos ou zoogleas sem regularidade precisa, e muitas vezes apparecem isolados, quasi invariavelmente tendo por *habitat*, as cellulas epitheliaes. Este microbio mede approximadamente um micromillimetro, e colora-se bem pelas côres basicas da anilina. A solução de Ziehl da-lhe bastante realce.

As culturas foram practicadas em diversos meios nutritivos; o melhor mostrou-se-me ser o agar-agar-peptonisado. Ahi as colonias representam-se ao cabo de 24 ou 36 horas sob a forma de gottinhas, que crescem depois para formar uma lamina na superficie do agar, simulando perfeitamente a gordura côalhada. A cultura em serie é a mais segura e de melhor exito. O exame microscopico denuncia em qualquer dessas colonias, a presença de cocci alongados, ora sob a forma de diplococcus, ora em cadeias de 3, 6 ou mesmo 8, ou sob ainda sob a forma de bacillo curto ou bastonete.

Quanto ao liquido branco secretado pelo microbio em questão, e que naturalmente é o mesmo por Griffiths encontrado nas urinas dos coqueluchentos, podemos dizer: não altera os globulos de sangue, como resultou das minhas verificações no campo do microscopio. Este facto está de accôrdo com o que se pensa actualmente a respeito da coqueluche. Porque a coqueluche ataca a infancia? Justamente porque a cellulas epitheliaes são menos resistentes na creança que no adulto, claro está que sendo ellas o habitat de preferencia do germen da coqueluche, será a creança preferida tambem pela molestia. O facto de não alterar as hematias, esse liquido branco do microbio, vem perfeitamente demonstrar, segundo a theoria mais logica, que a coqueluche é uma infecção localisada na região laryngeana e não altera directamente o sangue, acarretando pertubações febris, as quaes são sempre a consequencia de uma complicação sobrevinda no decurso da molestia. (Cadet de Gassicourt, Moncorvo, Clemente Ferreira, etc.)

Do estudo de diversos agentes therapeuticos resultou o seguinte quadro:

Substancias.	Dose.	Acção directa sobre o germen.	Acção sobre as culturas.
Permang. de pot	5 por cento	Nulla	Desenvolv. em 3 dias.
Creolina	½ por cento	do	Idem em 20 dias.
Salicyl. de sodio	5 por cento	do	Grande e rapido desenv.
Antipyrina	10 por cento	do	Grande prolifer. em 18 horas.
Acido phenico	5 por cento	do	Desenvolv. lento.
Sublim. corros	1:10:000	Alteração rapida	Nenhuma colonia.
Acido borico	10 por cento	Nulla	Desenv. em 16 dias.
Acido citrico	10 por cento	Alteração rapida	Ausencia de colonias.
Resorcina	10 por cento	Destrucção completa	Idem mesmo 1 anno depois.
Benzonaphtol	5 por cento	do	Nenhuma colonia.

De todos os agentes ensaiados em minhas experiencias só o sublimado corrosivo, o benzonaphtol, o acido citrico e a resorcina, deram satisfactorios resultados.

Os dois primeiros não tem uso para o caso por serem toxicos. O acido citrico e a resorcina produziram sobre o microbio especifico da coqueluche o effeito desejado. A resorcina, já é hoje bem conhecida como o melhor agente therapeutico contra aquella affecção; a sob a forma de badeggionages periglotticas foi a resorcina, ensaiada pela primeira vez com magnifico successo por meu pae, o Prof. Moncorvo, e esse seu methodo de tratamento é conhecido pelo nome de methodo brazileiro. O acido citrico (vide a nota enviada tambem para o Congresso, "Do acido citrico na coqueluche"), cujos resultados obtidos sobre o germen foram excellentes, assim se portou ainda no estudo clinico, em que parecen ser de grande valor no tratamento e prophylaxia da coqueluche.

O germen desta terrivel affecção esteriliza-se a 100°; resiste a 10° e 15°. O seu optimum medêa entre 35° e 45°.

Na inoculação do microbio da coqueluche usei de gatos, cobaias, cães, gallinhas, ratos brancos, etc.

Estes ultimos, em numero de 4, não tiveram symptoma algum da molestia parecendo possuir uma certa immunidade.

Os tres cães que foram inoculados com a erosão previa da garganta tiveram a molestia; em dois delles de mais tenra idade, os symptomas foram mais pronunciados. A mucosidade retirada do fundo da garganta destes animaes deixo a ver germen

em abundancia. Um gato que tambem foi inoculado, teve raros symptomas. Restabeleceu-se.

Oito cobaias tiveram a molestia com symptomas os mais caracteristicos. Alguns succumbiram por asphyxia. A secreção catarrhal foi examinada e os germens ahi abundantes foram cultivados e inoculados novamente com resultado.

Quatro gallinhas, tiveram a coqueluche bem caracterisada, pela inoculação do microorganismo especifico na sua tracheo-arteria.

Serviram pois para a identificação do microbio da coqueluche vinte animaes, dos quaes só os ratos brancos mostraram completa immunidade para a molestia.

Estes curiosos e difficeis estudos originaes só foram practicados na America do Sul por meu pae, o Prof. Dr. Moncorvo, auxiliado pelo meu illustrado amigo, Dr. Jayme Silvado, e nestes ultimos annos por mim.

SECTION III.—THERAPEUTICS.

Honorary presidents.

Dr. I. E. Atkinson, Baltimore.
Dr. A. D. Blackader, Montreal.
Dr. Simon Baruch, New York.
Dr. Norman Bridge, Los Angeles.
Dr. W. E. Casselberry, Chicago.
Dr. M. C. Caldwell, Chicago.
Dr. Charles Cary, Buffalo.
Dr. F. D. McDaniel, Mobile.
Dr. Manuel Dominguez, City of Mexico, Mexico.
Dr. Antonio A. Ramirez F. Fontecha, Tegucigalpa, Honduras.
Dr. J. Milton Bigelow, Albany.
Dr. J. H. Kimball, Denver.
Dr. John A. Larrabee, Louisville.
Dr. Justin Steer, St. Louis.
Dr. A. B. Miles, New Orleans.
Dr. Francisco R. Martinez, Santiago, Chile.
Dr. Ramón Mazaeredo, Cienfuegos, Cuba.
Dr. George L. Peabody, New York.
Dr. J. C. Mackenzie, Cincinnati.
Dr. A. D. Rockwell, New York.
Dr. Tomás Salazar, Lima, Peru.
Dr. A. A. Smith, New York.
Dr. James Tyson, Philadelphia.
Dr. H. C. Wood, Philadelphia.
Dr. James T. Whittaker, Cincinnati.
Dr. James C. Wilson, Philadelphia.

Executive president.

Dr. Hobart Amory Hare, 222 South Fifteenth street, Philadelphia, Pa.

Secretaries.

Dr. Edward Randall (English-speaking), Galveston, Tex.

Dr. David Cerna (Spanish-speaking), Galveston, Tex.

Dr. Del Arca (Paraguay 840), Buenos Ayres, Argentine Republic.
Dr. Manuel B. Mariaca, La Paz, Bolivia.
Dr. Alvaro Alberto da Silva, Rio de Janeiro, United States of Brazil.
Dr. J. L. Davidson, Toronto, Canada.
Dr. Manuel Plata Azuero, Guaduas, Republic of Colombia.
Dr. Domingo L. Madan (Contreras 13) Matanzas, Cuba.
Dr. J. Luis Estrada, Guatemala City, Guatemala.
Dr. F. L. Miner, Honolulu, Hawaii.
Dr. Ramón Midence, Tegucigalpa, Honduras.
Dr. Fernando Altamirano (Instituto Médico), City of Mexico, Mexico.
Dr. Alvarez, Granada, Nicaragua.
Dr. Americo Ricaldoni, Montevideo, Uruguay.
Dr. Vicente G. Guánchez, Caracas, Venezuela.

MINUTES OF THE SECTION.

The section on therapeutics met in parlor 32 of the Riggs Hotel, Wednesday morning, September 6, President Hare in the chair.

The proceedings were opened by a brief address from the president.

The first paper was read by Dr. J. Mount Bleyer, of New York, upon "The chemical import of koumiss," which elicited considerable discussion. Dr. Brush, of New York, stated that he made and represented the koumiss which had been condemned by Dr. Bleyer, and he thought, in all fairness, that the koumiss side should be heard and a distinction drawn between koumiss and koumisgen, which was recommended by Dr. Bleyer. The latter, prepared from skimmed milk, dried and powdered, was deprived of its most important nutrient properties, and removed what is known as "hickory cheese." Replying to the statement that koumisgen was more digestible, he called attention to the fact that, inasmuch as it kept indefinitely without change, it was practically indigestible, and stated that it was known that the more quickly a food decomposed the more easily it was digested.

Dr. Tyson had no large experience in the use of koumiss in affections of the kidney, but one point had been alluded to by both of the speakers to which he would add a few words which were pertinent. It was the use of skimmed milk in chronic Bright's disease. He had been surprised to note how common it was to recommend the use of skimmed milk in chronic Bright's disease. Now, in doing this we remove the one constituent which was most harmless in Bright's disease, i. e., the fat, and leave that which has harmful tendencies, that is, the caseine, which is the nitrogenous constituent, where alone urea can be made and uræmia invited. On the other hand, it is known that whole milk is often illy borne, and that some dilution is required on this account, as well as to encourage diuresis. It is therefore much more sensible to give the whole milk diluted by water than to use skimmed milk from which is removed the nonnitrogenous and retaining the nitrogenous. It is much more desirable, if possible, to remove the caseine and leave behind the fat, if milk is desired as a food in chronic Bright's disease.

Dr. Baruch stated that on the question at issue he had only to say that he had never used koumiss unless the patient objected to milk or the stomach did not retain or digest well the latter. In such cases he had found koumiss a good substitute.

Dr. Blackader, of Montreal, said: "Of the value of milk as a reconstructive, there can be no difference of opinion among us. Good, fresh milk will always command the first place in our dietary, and we, when insuperable objections occur to its use, should resort to its modifications. Koumiss is milk minus its sugar, which has been partly converted into alcohol and lactic acid, and, owing to the presence of carbonic acid, has the property of effervescence. There are conditions in which these alterations are of service to us. In children I find the effervescent properties rather an objection. Therefore koumiss, I think, will probably always occupy a place, but always a subsidiary place, in the list of our dietetic measures."

Dr. Brush, replying to question from the president, stated that no alcohol was used in the preparation of koumiss. He stated further that spayed cows would continue milking indefinitely, and that he had spayed a heifer of 2 years, and, by means of soda-water bottles dipped in hot water and the mouth applied to the teats, had caused her to give milk, perhaps 2 quarts daily, for six months.

Dr. Bleyer, replying to question of chairman in reference to the administration of warm koumiss, stated that in certain conditions, administered at 60° F. it was preferable to cold koumiss. The chairman stated that unless it was handled by means of a champagne tap it could not well be given warm. If this tap were used the liquid would not only be deprived of its sparkle but of its nutrient properties, as the curd would fail to flow through the tap.

Dr. Bleyer stated that he had no interest in the preparation of koumisgen, which he had recommended, and did not know its manufacturer personally.

Dr. J. W. McLaughlin, of Austin, Tex., read a paper with the title, "Some views regarding the philosophy of drug action."

Dr. Atkinson, of Baltimore, read a paper upon "Venesection in the treatment of engorgement and dilatation of the right side of the heart."

In the discussion which followed, Dr. Tyson, of Philadelphia, said: "My experience with this treatment has been that, while temporary flattering results followed venesection, as exemplified in a case of acute croupous pneumonia where there was stretching of the right ventricle, there has been no permanent relief, and the patient has ultimately died. I am, therefore, gratified to learn that Dr. Atkinson has had satisfactory permanent results."

Dr. J. H. Musser, of Philadelphia, said: "My experience accords with that of Dr. Tyson, based upon its use in patients in the Philadelphia Hospital. It is true that the patients of that institution are not proper subjects upon which to base conclusions of treatment. Many are old, broken-down subjects, with degeneration of all organs. On the other hand, in one patient in private practice, a man aged 19, with right-sided engorgement, repeated bloodletting gave relief to repeated engorgement. Leeches over the præcordia and dry cups over the back were used. The patient died of other causes."

Dr. D. D. Stewart, of Philadelphia, thought that perhaps bleeding from the jugular or tapping the ventricle of right side of the heart might be useful. He thought also that the liver could be tapped with benefit.

Dr. Hare reported a case of enormous engorgement of the right side of the heart which was temporarily relieved by aspirating the right ventricle, soon followed, however, by death. He stated, further, that his experiments upon the lower animals (dogs) convinced him that tapping the heart was not as dangerous as generally supposed.

Dr. Edward Randall, of Galveston, had seen good results follow venesection in right sided engorgement.

Dr. Atkinson replied that permanent relief was only relative, and in the case mentioned by Dr. Hare the degree of degeneration of heart muscle was too far advanced for permanent good to result from venesection.

Dr. Rockwell read a paper upon "The treatment of exopthalmic goitre, based on forty-five consecutive cases."

Dr. Baruch, of New York, read a paper, which was discussed by Dr. Auld, of Philadelphia, and Dr. S. Solis Cohen, of Philadelphia. The latter said:

I have only to thank Dr. Baruch for his services in personally directing the attention of medical men in America to the uses of water in the treatment of disease, and to say that my experience confirms what he has said in regard to the effect of the stimulant and trophic influence of cold water in adding to the vital tone of the patient in such conditions of asthenia as are found in hysterical and neurasthenic patients and in the reinforcement of the patient's vital energy and resisting power in fighting pulmonary tuberculosis.

"A Plea for Physiological Remedies" was the title of a most interesting and instructive paper from Simon Baruch, M. D., New York City—discussion by Dr. John Auld, Philadelphia.

Dr. D. D. Stewart, of Philadelphia, next read a paper upon "Treatment of chronic gastric catarrh" and allied conditions of lowered HCl. acidity. Dr. Blackader, of Montreal, asked the means of introducing the electrodes, and Dr. Stewart replied

that by deglutition tubes. Dr. Blackader stated that he had used with benefit upon a case of neurotic dypepsia lavage and electricity (galvanic and faradic) every second day for three months and that marked relief followed.

Dr. Rockwell, of New York, said that the great merit of the Einhorn electrode is the readiness with which it can be introduced, but in certain gastric disorders, especially dilatation, he found it inefficient. In this condition the bipolar electrode, using the induced current of quantity, is of great value. We wish here to get positive contractions of the muscular tissue of the stomach and experience shows that these can be obtained far more effectually by the bipolar method with currents of quantity than by unipolar method with currents of tension.

Dr. Stewart asked Dr. Rockwell if in the use of the bipolar method the parts between the poles were not the only ones affected, and if he used this method upon the empty or full stomach? Dr. Rockwell replied that the whole stomach was affected; that he had never used the method except upon an empty stomach.

Dr. Rusby was much interested in papoid and asked about papain, stating that Dr. Jacobi had said it would dissolve diphtheritic membrane in three hours. Dr. Stewart replied that he has used papain upon the recommendation of Chittenden and as a dernier resort.

Dr. D. D. Stewart advocated in all cases of neurasthenia attention to the condition of the stomach. In all the cases that he has had anything to do with he had noticed some disturbance present usually in the direction of greatly lowered HCl. acidity. In these cases the use of an active pancreatic extract is of the greatest value, especially administered before meals. HCl., also, given after meals, must also be used. The use of these artificial digestants conserve nerve-energy and their utility is therefore evident.

Dr. McDaniel, of Alabama, asked the author of the paper whether or not he had noticed or noted the proportion between neurasthenics of a corpulent or heavy weight type and those of the opposite type, and what difference of treatment he is inclined to apply to these different classes of patients. Dr. J. Wellington Byer of New York, asked the question whether cases of neurasthenia in which organic changes such as Arterio telerosis had taken place, it was possible to effect a cure. This was important to know both for purposes of prognosis and to discriminate between organic and functional condition. The first were incurable, the latter not so.

Dr. Dercum did not agree with Dr. Stewart regarding the use of digestants; that in his experience they were unnecessary in the majority of cases. Further, that he was not as sanguine as Dr. Buzzard, inasmuch as the results of the rest cure are not by any means satisfactory in such diseases as paralysis agitans or the chorea of adults which were still to be classified as functional diseases. When arterio-sclelerosis or other "terminal" changes are present the possibilities of the "rest cure" are limited. The greater proportion by far of neurasthenic women are below weight, occasionally they are excessively fat. In these cases a special dietary is instituted. Fats and carbo hydrates are excluded, skimmed milk, lean meats, succulent vegetables, fruit, etc., are used.

Dr. Dercum's paper elicited the following discussion: Dr. Baruch, of New York, said that the paper was a good clinical demonstration of the principle advocated by himself in the morning. The chief advantage of the rest cure was the methodical application of diet, rest, exercise, etc. He insisted upon the pedometer being used to measure exercise in diabetes. If, as the author has stated, the chief characteristic of neurasthenia is a lack of resistance to fatigue, we have in hydrotherapy a most valuable remedy. Vinaj, of Italy, has shown by graphic experiments with the Ergograph that by the application of the jet douche and rain hail, i. e., water delivered under pressure, there is an enhancement of resistance to fatigue in the muscles which the Ergograph registered perfectly. It is always gratifying to find a rational explanation of hydriatic procedures, for only in this way can we establish a remedy.

There is only one criticism to make. It is the author's indefiniteness referring to the

wet sheet; he has given no temperature, no directions, nor the method. If it is cold wet sheet, it may be 45° F. in December and 80° F. in August, and yet be a cold wet sheet.

The great difference in effect of hydriatic application he had personally noticed and in his prescription of hydraulic pressure he defined temperature, duratioa, method, and number of pounds pressure. He had devised a method for modifying the pressure with which water is delivered.

Dr. James Tyson, of Philadelphia, next read a paper upon the treatment of gout, which covered the points so thoroughly that it elicited no discussion.

Dr. David Cerna, of Galveston, presented a paper upon the therapeutic uses of phenecoll, with special reference to its employment in malaria.

Dr. L. B. Anderson, of Norfolk, Va., read a paper upon the philosophy of therapeutics.

The following were read by title:

Spanish title: Algunos datos farmacológicos acerca de catorce plantas Mexicanas. (Pharmacological data about fourteen Mexican plants.) By Dr. Fernando Altamirano, of City of Mexico.

O acido citrico na coqueluche por Moncorvo Filho, Rio Janeiro, Brazil. (Citric acid in whooping cough.)

Contribución á la therapéutica de la fiebre amarilla. (Contribution to the therapeutics of yellow fever.) By Dr. Pedro Peñuelas, Havana, Cuba.

Une plante convéniente du Brésil. (A convenient plant of Brazil.) By Dr. J. B. La Cerda, Rio Janeiro, Brazil.

Action physiologique de quelques plantes brésiliennes de la famille des menispermacées. (Physiological action of some Brazilian plants, belonging to family of menspermacea.) By Dr. J. B. de La Cerda, Rio Janeiro, Brazil.

Algunas aplicaciones de la creasota de haya. (Some applications of beech wood creasote.) By Dr. Enrique E. Lopez, Jalisco, Mexico.

Physiological action of alcohol, by David Cerna, M. D.

Printed pamphlet entitled "Formulario de la facultad médica de México." (Formulary of the medical faculty of Mexico.) By Dr. Guillermo Parra, of City of Mexico.

The use of nitroglycerin in arterio-sclerosis, by Thomas G. Ashton, M. D., demonstrator of clinical medicine in the Jefferson Medical College.

The anapyretic action of calomel, by Drs. R. J. Nunn and A. B. Simmons, Savannah, Ga.

The effect of advanced civilization on disease, by W. J. Moody, M. D., Plainfield, Iowa.

The treatment of epilepsy, by Richard H. L. Bibb, M. D., Tabillo, Mexico.

The treatment of scarlet fever by chloral hydrate, by James C. Wilson, M. D., Philadelphia.

The advantages of amorphous phosphorus over the offensive form, by E. Q. Thornton, M. D., Philadelphia, Pa.

The following resolution was received from the list of the section on pharmacy:

Resolved, That this section recommends that steps be taken toward the preparation of a Pan-American Pharmacopœia.

Resolved, That a committee of three, of whom the president of this section be one, be appointed by the chair and that the section on therapeutics be requested to appoint a similar committee, the two committees to act jointly in formulating a general plan for carrying out the above idea; this plan to be presented, with recommendations by the two sections, to the executive board of the congress.

The president appointed for this section Dr. H. H. Reesby, chairman, Dr. A. W. Miller, and the president.

President Hare appointed from the section on therapeutics Dr. Edward Randall, Dr. David Cerna, and the president.

All official business having been completed, the section adjourned.

PAPERS READ BEFORE THE SECTION.

ANESTESIA.—LA TÉCNICA DE LA CLOROFORMIZACIÓN.

Por ANGEL CONTRERAS,
Médico-Cirujano de la Facultad de México y Delegado por el Estado de Yucatán.

SEÑORES: Un voto de gratitud eterna para los inmortales genios de Soubeiran, Simpson y Flourens, á quiénes se debe el uso de la anestesia por el cloroformo.

He aquí mis primeras palabras ante esta ilustre asociación, á quien pido excusas por abordar un punto de tan vital importancia, yo, el último de sus miembros, un pigmeo; pero creo que al tratar este asunto, la autorizada y competente voz de las lumbreras científicas que me rodean podrá uniformar puntos de práctica divergentes entre las diferentes escuelas y naciones, haciendo adoptar los procederes más inofensivos, expeditos y rápidos.

Tres son las poderosas palancas de los positivos progresos alcanzados por la cirugía moderna; es sin duda la primera por órden cronológico, la anestesia; á la antisepsia toca la parte más decisiva; la hemostasis es el complemento de estos perfeccionamientos en el siglo XIX.

Soubeiran descubrió el cloroformo en el año de 1831 entre los productos químicos de la série methílica.

La historia nos refiere que el 14 de octubre de 1846, Morton produjo la anestesia por medio de las inhalaciones del éter delante de gran número de médicos y alumnos de la Facultad de Boston en un paciente á quien Warren estirpó un enorme tumor del cuello, en medio de la completa insensibilidad; pero un año después Simpson y Flourens, por medio de memorias presentadas en las academias, proclamaban y sancionaban el uso del cloroformo, que desde entonces se ha generalizado, como todo lo que es realmente útil.

En la República Mexicana, de la que soy inmerecido delegado en este congreso, el Dr. Miguel Jimenez hizo uso de la anestesia por el cloroformo desde esa época, en los soldados que defendieron la independencia de su patria contra la invasión americana.

Desde su cuna han rivalizado las aplicaciones del cloroformo y del éter para producir la anestesia, sin que hasta el día haya vencido alguna á su antagonista, lo que prueba que ambas son buenas, y cada quien ensalza generalmente el agente que más ha empleado.

Los médicos mexicanos recurrimos casi siempre al cloroformo.

El éter, á la altura de 2,270 metros sobre el nivel del mar, á que se encuentra el Valle de México, es demasiado volátil y requiere más que en otros lugares el uso de aparatos especiales para su aplicación en inhalaciones.

Se admite, en general, que la cloroformización se obtiene con más rapidez que la eterización, que sus efectos son más duraderos ó intensos, que la excitación que produce es menor, que los vapores del cloroformo no se inflaman ni provocan gran secreción salivar y brónquica como los del éter, que este último agente expone más al

síncope cardiaco tardío y el cloroformo al del principio; pero lo que debería resolver totalmente la preferencia por uno ú otro agente anestésico sería el guarismo de su mortalidad comparativa, lo que no ha podido establecerse con perfección; porque los casos no son siempre comparables al grado de que se pueda imputar igual responsabilidad al anestésico; porque el cloroformo es más usado que el éter, de suerte que no debe compararse en lo absoluto la cifra de las defunciones de uno y otro, y porque no se publican todos los casos desgraciados.

De las investigaciones de Arloing puede deducirse para casos especiales que el éter es preferible en individuos cuyos pulmones y corazón derecho estuvieron enfermos, mientras que el cloroformo convendría mejor á aquellos que tienen afecciones del corazón izquierdo, y según Duret cuando hay simple atonía de los ventrículos. Algunos opinan que en los casos de estrangulamiento herniario debería recurrirse más bien al éter, en atención á la hipóstasis pulmonar y á la peligrosa dispena que provoca el cloroformo.

No me detendré sobre el modo de obrar del cloroformo, ni expondré los fenómenos que determina por la abolición sucesiva de las funciones del cerebro, de la médula y del bulbo, recordando únicamente que la ciencia de la cloroformisación es dar bastante anestésico para suprimir la sensibilidad y el movimiento; pero no tanto que paralice la acción del corazón y de los pulmones.

Es un hecho inconcuso que en cualquier tiempo de las inhalaciones del cloroformo suele tener lugar excepcionalmente la muerte del paciente.

En un principio creyeron algunos que el éter estaba exento de ese funesto accidente, y se refiere que Hayward recorrió la Europa buscando un caso de muerte provocado por las inhalaciones de dicho anestésico.

El tiempo ha hecho patentes, no un caso sino varios, tanto durante la eterización como en la cloroformización.

Autores de nota ha habido, como Sédillot y Gosselin, que han sostenido, por lo menos en cierta época, que el cloroformo puro y bien administrado no ocasiona la muerte.

Creo que la opinión general es hoy que á pesar de la pureza del agente anestésico y de la pericia del médico, puede sobrevenir una desgracia.

Tambien está establecido que la desgracia puede depender de varias circunstancias en la administración del anestésico, por lo que se comprende la importancia que tiene la técnica del uso del cloroformo, que es la que deseo precisar, pués es muy general que cada quien procede según sus inspiraciones ó costumbres personales, y como que la muerte durante la anestesia es excepcional, recuerdo haber leido que Billroth no ha tenido su primer revés, sino después de haber chloroformado 12,500 individuos, se comprende la necesidad de que eminentes prácticos, encanecidos en el arte, como los que me escuchan, establezcan cual es el mejor proceder.

Por mucho tiempo, creo que ha reinado el método de las inhalaciones interrumpidas y en fuertes dósis. Se vertía uno ó dos gramos de cloroformo en un pañuelo en forma de cono ó en otro utensilio semejante, que se comenzaba por llevar hácia la boca y naríz del paciente, dejando amplio acceso al aire; después se iba aproximando más, se aumentaba la dósis del cloroformo, y cada vez que se juzgaba terminada la evaporación se retiraba el pañuelo temporalmente para echar en él más líquido, quedando la graduación de la dósis y el tiempo de la interrupción á discreción del cloroformador.

Al Dr. Labbé se debe, desde el año de 1882, el método de las inhalaciones continuas, que no impresionando los centros nerviosos con distintas intensidades, tiene que ser muy favorable para evitar accidentes y economizar además tiempo y cloroformo.

En México, el Dr. Miguel Cordero, á quien la inexorable parca quitó la vida en este año, presentó á la Academia de Medicina en enero de 1890 y de 1891, memorias fundadas en casos públicos, numerosos y detallados, sancionando su procedimiento de anestesia rápida, no siderante, obtenida con las inhalaciones de cloroformo.

Su especialidad consiste en la continuidad de las inhalaciones, vertiendo frecuentemente varias gotas antes de que termine la completa evaporación en la superficie externa del lienzo, que no separa ni un momento de la boca y naríz, y á las que hay libre acceso del aire.

Transcribiré la técnica descrita por el mismo Dr. Cordero en la página 122 del tomo XXV de la Gaceta Médica de México:

El aparato empleado nada tiene de especial: unas veces, pocas, la tela de algodón extendida sobre un esqueleto de alambre, del aparato de Esmarch, otras, el mayor número, el simple alcartáz de lienzo de algodón con su abertura superior suficiente para dar acceso al aire, y no encerrando en su interior ni esponja, ni hilas, algodón o algún otro cuerpo para recibir el líquido, pués este ha sido siempre vertido por pequeñas porciones en la superficie libre del cono.

Cuando se han dejado caer las primeras gotas, se acerca éste de manera de cubrir la boca y naríz del paciente, pero conservando una pequeña distancia en su base para dejar tambien por allí libre el acceso del aire; la caida de las primeras gotas de cloroformo en el cono de lienzo produce sobre este una mancha que no desaparece, sino cuando el líquido se ha evaporado completamente; antes que tal cosa suceda (lo cual se verifica en una fracción de minuto), se vierten nuevas gotas en la superficie libre del cono, y esto se sigue repitiendo, mientras que en el enfermo no se observe alguna de los fenómenos que indiquen una marcha irregular en la anestesia, en cuyo caso se suspende la inhalación; no habiendo este motivo, se continúa el acto hasta que la desaparición del reflejo palpebral y de los movimientos demuestren que se ha llegado al grado de anestesia, suficiente para practicar sin dolor cualquiera operación. Durante ésta, se sostiene la inhalación, pero poniendo en el lienzo cantidades menores de cloroformo, y aún haciéndola con intermisiones hasta la conclusión del acto.

De las observaciones del Dr. Cordero resulta: que en ninguna de ellas ha causado la muerte el cloroformo, que el promedio del tiempo necesario para obtener la anestesia quirúrgica ha sido de 6 á 8 minutos, y que la cantidad de buen cloroformo empleada fué de 18,60 gramos, habiendo durado las maniobras operatorias en término medio de diez y ocho á sesenta minutos.

Estos resultados son muy satisfactorios relativamente á los que producen los otros métodos y procedimientos, y llaman más la atención en México, donde siempre se había notado que con el uso de las inhalaciones del cloroformo interrumpidas y en fuertes dósis se empleaba más tiempo para obtener la anestesia quirúrgica que en Europa procediendo de igual manera.

Se había discutido la causa de esta diferencia y unos la atribuían á la considerable altura sobre el nivel del mar á que se encuentra el Valle de México, pués en tal virtud, decía el Dr. Ramos ante la Academia de Medicina de México, la rarefacción del aire facilita la evaporación de los líquidos volátiles como el cloroformo, lo cual hace que en igualdad de volúmen de aire inspirado haya menos cantidad de anestésico absorbido. Otros referían la diferencia de tiempo á la clase de cloroformo empleado; pero el que se prefiere generalmente es el inglés de la casa de Duncan Flockhart y Compañía, que nos llega en fiolas de color obscuro herméticamente cerradas á la lámpara. En fin otros atribuían la diferencia mencionada al modo de administrar el cloroformo, los estudios del Dr. Cordero apoyan este último parecer.

En el Hospital General del Estado de Puebla, donde sirvo en calidad de profesor de clínica externa de la facultad de esa entidad federativa, he usado en estos últimos años el procedimiento de cloroformización del Dr. Cordero y he confirmado sus propias observaciones.

En el mismo hospital, alguno de mis compañeros ha acostumbrado últimamente cloroformar tambien por el método de las inhalaciones continuas; pero poniendo mayor cantidad de cloroformo y aplicando estrechamente el pañuelo al rededor de la boca y naríz, sin dejar abertura libre en el centro del pañuelo para el paso del aire. Este es el procedimiento que llamamos por asalto. Los dos pulgares apoyan los ángulos superiores del pañuelo contra los carrillos, y con los índices se fijan los ángulos inferiores á las ramas ascendentes del maxilar inferior y se empuja dicho maxilar hácia adelante; el cloroformo es vertido frecuentemente y en fuerte dósis

sobre la parte media del pañuelo que queda entre la boca y naríz, sin retirarlo para nada.

La verdad es que los resultados obtenidos por este procedimiento son rápidos y que no hay grande excitación ni aún en los alcohólicos; pero es de temerse siempre por este procedimiento la asfixia ó el síncope, lo mismo que la susceptibilidad individual para el cloroformo, la que no puede estimarse, sino por medio de la gradución de las dósis.

El Dr. Bolognesi (del Mans) ha aplicado últimamente la cloroformización en dósis cortas y continuas en la posición declive sobre el plano inclinado. Sus hechos se refieren á casos de laparotomía; pero tan ventajosos han sido los resultados de la congestión encefálica determinada por esta posición, en la marcha y excelencia de la cloroformización, que pudiera generalizarse el procedimiento del Dr. Bolognesi en la práctica de diversas operaciones.

Según dicho autor los fenómenos congestivos del encéfalo son un medio preventivo del síncope cardiaco, que es el más grave de los accidentes de la cloroformisación, y la respiración no está entorpecida más que por fenómenos mecánicos que es fácil remediar con el uso de la pinza de lengua, la propulsión del maxilar inferior y el empleo de la mesa inclinada.

Respecto á los accidentes de la cloroformisación, mencionaré únicamente la justa opinión emitida en la Sociedad Iatromática por uno de mis compatriotas, el Dr. Hurtado, quien dice "que solo los accidentes que se anuncian son los que el mayor número de veces se pueden contrariar y aún evitar, pero que los llamados justamente fulminantes, raras veces se pueden dominar, generalmente no dan lugar á prevenirlos, ni mucho menos á salvarlos."

REMARKS ON ANÆSTHESIA.

Dr. Hamilton was interested in the statement that chloroform was the favorite remedy in a city of the altitude of the city of Mexico, where the heart muscle would seem to be normally severely taxed. In Chicago it had come to be a routine practice to test the urine as preliminary to operation. In all cases where there were signs of kidney abnormality, chloroform was always preferred. In other cases ether was given.

Dr. E. Laplace, Philadelphia. I have seen six deaths from chloroform in the various clinics of Europe and have never seen a death from ether. Death seemed to begin first with a disturbance of respiration.

THE VALUE OF THE COLD BATH IN THE TREATMENT OF ASTHENIC DISEASES OTHER THAN TYPHOID FEVER.

By SIMON BARUCH, M. D., of New York.

The fact that this subject has been chosen for discussion is a happy augury for rational therapeutics. When I have hitherto referred to the cold bath as a method of treatment for an asthenic disease, I have almost invariably been met with the query, "Would not the shock be too depressing to the patient?" The question for discussion here is an evidence of an awakening to the value of the best remedy for asthenic conditions which we have. Instead of defining asthenia, let us take as an example the most typical forms we meet, one a temporary, the other a more enduring condition. Surely a woman who has fallen in syncope presents the most complete picture of asthenia. Her pulse is feeble or absent, her respiration is shallow, sensation and motion are practically abolished, the patient's vital powers lie dormant, as it were. What is the treatment which long usage has so sanctioned that even

lay people constantly resort to it? The application of cold water to the periphery, the face or chest, is that remedy. You are all familiar with the result. The merest tyro in medicine can give its rationale. There is a reflex stimulus to the nerve centers, a deep inspiration ensues, the wheels of life again are set in motion, color returns to the pallid cheek, the glazed eye brightens, the pulses beat again, the asthenic condition is removed as no other agent can remove it.

Let us take a more frequent asthenic condition. A patient suffering from an infectious disease lies prostrate, with thready pulse, shallow breathing, dull eye, picking at the bed clothes, subsultus, involuntary defecation. All these remind us that here we have the very climax of asthenia. What shall we do? Will digitalis and strophanthus arouse a heart whose response depends upon these obtunded nerve centers? Strychnine gives us some aid, because it stimulates the nerve centers. But seat such patient in a shallow warm bath and pour with some force one or two basins at 75° or less over his head and shoulders, rub him gently, repeat if indicated. The result will astonish those who have not tried it. There is a gasp for breath, the dull eye resumes its luster, the facial cyanosis yields to a better hue, the pulse becomes slower and less compressible. The wheels of life are again set in motion, not as in the case of syncope to remain so, but to again be overwhelmed by the toxic blood which supplies the nerve centers. Again and again this affusion must be repeated. Fear not the so-called shock, for this is just what you want to evoke. It is, when judiciously administered, followed by reaction, and reaction is the great stimulus, greater than all medicinal agents or alcoholic stimulants. These are clinical facts, observations made at the bedside. They are, at least, as reliable as those made on medicinal agents.

In low forms of scarlatina, when the feeble, rapid, thready pulse and cyanotic appearance of the skin present every feature of asthenia, several dips of the patient into water at 60 to 75°, followed or accompanied by friction, arouses the feebly-acting heart more quickly and reliably than all other known stimulants.

What is the rationale of the action of cold water in these typical cases of asthenia? Heart failure stands like a specter at the bedside, and the physician often labors in vain to banish it. Heart failure kills. Heart failure is the culmination of asthenia. How does the application of cold to the periphery restore vigor to the drooping heart? Macey, Traube and others have shown that in these asthenic conconditions we have a loss of tone in the smaller vessels, a paresis of the muscular coats, and of the elastic tissue which acts the part of muscular coat in the peripheral capillaries. Now it is a well-known physiological fact that the circulation of the blood depends not only upon the vigorous, healthful action of the heart, but also upon the integrity of the arteries and capillaries, by whose elastic resolvency the blood is pelled through the finest tubes. Surely the propulsion of a viscid fluid-like blood through such fine tubes would be impossible unless the latter were endowed with propulsive powers.

What results when the latter is lost or in abeyance? The heart must increase its force to overcome an obstruction at points where it formerly received aid. It is pumping against paralyzed vessels; the blood stagnates in the smaller ones, giving rise to hypostatic congestion, and then is the difficulty increased. No wonder that the heart labors harder, that the pulse rate increases, and its tension is lowered. No wonder that its ganglionic forces are exhausted and that the heart yields at last to the dread pressure upon its vital forces, which are sapped besides by the toxic blood supplying it. Apply a judicious hydrotherapeutic procedure in such a case—let it be a cold affusion, dip, spray, ablution, a bath, but let it be adapted to the case and always accompanied by friction. What is the result? There is a local stimulus to the coats of the superficial vessels; they contract again under the impact of repeated cold wave followed by friction. Their paresis is removed; they again propel the blood as was their wont. The dam is cut, as it were; the blood again flows freely through the terminal vessels; the heart responds to the relief

afforded by a slower and more deliberate contraction, higher tension, and absence of dicrotism. At the same time the central nervous system is bathed by cooler blood, blood which is better oxygenated, and thus the cardiac ganglionic centers receive new life at one end while at the other the labor of propelling the blood is removed.

If any one doubts the *rationale* let him see the dead, pale skin (except the dusky face) of an advanced typhoid redden under this procedure and come out glowing with the roseate hues of health, and he will be convinced; let him see the marbled skin of a low scarlatina brighten up under the friction and bathing and resume its crab color, and he will no longer doubt. In chronic conditions phthisis offer a good illustration of the effect of hydrotherapy in removing the obvious asthenic conditions.

We have the testimony of Ziemmssen, who refers to it as "a remedy of extraordinary value." Indeed, clinical demonstration of the "value of the cold bath in asthenic conditions" is abundant. The Montefiore Home for Incurables receives its supply of patients from other hospitals which decline to retain them on account of their incurability and protracted nature. Here I have had an opportunity of testing the question in a satisfactory manner in cases of phthisis, Bright's disease, diabetes, and a variety of functional and organic nervous diseases which make this institution the Salpetriere of America. The gradual education of the reactive capacity in these desperate cases and the improvement of the nutrition in many of them offer interesting illustrations of what may be accomplished by the methodical application of water. The annual reports of this institution furnish details with which I need not burden you here. I will cite only the cases from private practice that may be of interest. A young man from Kentucky, who had been pronounced phthisical (right apex, first stage) by Dr. Janeway, and whose sputum had been found, at the Vanderbilt Clinic Laboratory, to contain bacilli, without appetite, emaciating for six months, etc., was treated at the Hydriatuc Institute from August, 1892, to January, 1892, with the result of 16 pounds gain, and complete removal of bacilli (examined at the Vanderbilt Laboratory by Dr. Van Gillen seven times). He has remained well, and his brother is now under treatment for the same (more advanced) trouble and has gained 4 pounds in three weeks. A middle-aged lady who had been operated on (cervix of perineum) by Dr. Ralph Waldo, and who had been bedridden for two years, was advised by Dr. Charles Carroll Lee, called in counsel by Dr. Waldo, to place herself under hydratic treatment. She was carried into the institute by her husband and brother, presenting every manifestation of pronounced neurasthenia of the melancholic type. Her reactive capacity was feeble, but it was gradually raised, until after six months' treatment she asked to be allowed a bicycle, so active and strong had she become. She is now in good health. With these brief histories I may conclude my commendation of the "cold bath in asthenic conditions," acute or chronic.

THE PHYSIOLOGICAL ACTIONS OF ALCOHOL.

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Almost from time immemorial alcohol, in some form or another, has been used as a beverage the world over; and for a long time as a remedial agent in the treatment of disease. Without attempting to discuss the uses of the drug in disease, a subject in itself considerably extensive, I will confine myself to carefully study the physiological actions of the drug.

Both experimental and clinical observations have shown that alcohol acts decidedly on the different systems, producing changes, either temporary or permanent,

according to the amount of the drug ingested and the time employed in its administration. How such changes are brought about by the actions of alcohol, it is the purpose of this research to examine and, if possible, to determine. The evidence which I shall bring forward will be mainly experimental.

GENERAL ACTION.

The effects produced by alcohol in small amounts are those of general stimulation, followed by those of depression when given beyond what may be termed the true physiological limit. In large or toxic doses, when administered for a short or for a long time, there are produced two conditions well known and sufficiently described by various writers upon the subject: acute and chronic alcoholism.

In the first instance, the chief phenomena manifested are a weak, compressible, rapid pulse; a slightly increased at the onset, soon followed by a diminished bodily temperature. The skin becomes cool, moist, and relaxed, accompanied with pallor of the face; the breathing, although not interfered with much at first, may be somewhat accelerated, but generally towards the last assumes a slow, stertorous character; the pupils are either contracted or dilated, while the smell of the drug in the breath of the patient or animal is a common and well-known occurrence. These various symptoms gradually emerge into a mild form of the well-recognized condition known as delirum tremens, followed by stupor, coma, and death.

In the chronic form of alcoholism the chief symptoms are of a nervous character. One of the most common symptons is general loss of motor power. In these cases, at least in the majority of them, the upper extremities are affected before the lower ones. Sensation is similarly, and perhaps more profoundly than is motion, influenced. Tremors are common, these being confined to the arms and head. They are more frequent in the morning, and are improved or removed by small doses of alcohol. Often it becomes difficult to diagnose between palsy of alcoholic origin and the general paralysis occurring in the insane. Camuset* has reported instances in which tremors, general loss of muscular power, delirium of grandeur, unequal pupils, fibrillary contractions about the mouth, and all the supposed characteristic symptoms of the organic disease were present, but which resulted in cure upon the forced disuse of alcohol. Broadbent† has described a form of alcoholic paralysis of spinal origin, probably due to multiple neuritis, and said to occur more frequently in women than in men. Similar cases have been observed by Lancereaux quoted by Wood;‡ but these vary considerably in their features. It is stated that "there is at first gradually-increasing weakness of the lower extremities, when suddenly marked loss of power becomes manifest in the extensor muscles of the forearm, giving rise to double wrist-drop. The flexors of the hand may be affected very early. Usually, somewhat later, they become paralyzed, so that the hand is like a flail. Although the patient can walk and the movements of the elbow and shoulder are vigorous, the paralysis rapidly advances, until all four extremities are almost completely motionless, the arms, as a rule, being more seriously implicated than the legs. The reflexes are abolished. There is usually no pain, though the muscles may be tender on handling, and the sphincters retain their functional powers. In one of Broadbent's cases, however, sharp pains shot down the legs, and there was an incontinence of urine. In the course of a few days the muscles of the trunk become implicated, and the patient dies of paralysis of respiration, precisely as in ascending palsy. Loss of tone in the capillaries, with consequent livid congestion of dependent parts, is said to be diagnostic of this form of paralysis. Careful examination of the spinal cord failed to detect any lesions."

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* Ann. Méd. Psycholg., vol. x, p. 201, 1883.

† Medico-Chir. Transactions, vol. LXVII.

‡ Nervous Diseases and their Diagnosis, p. 60, 1887.

Attacks of insanity are of frequent occurrence, and the *mania a potu*, although it may assume any form, is usually characterized by evil visions, says Wood.*

Delirium tremens is a peculiar series of acute symptoms which are produced by excessive drinking. The affection is especially apt to develop upon the sudden cessation in the use of the stimulants, but may come on during the debauch. In their mildest form the symptoms constitute that condition known by old drunkards as the "horrors," in which the sleep is disturbed, the hand tremulous, the mind weak and confused, and the patient troubled with frightful imaginings, vague alarms, and apparently causeless depression of spirits. When the attack is more severe, hallucinations of sight, of hearing, and, more rarely, of touch, occur. These hallucinations always have in them an element of terror or of horror. Disgusting objects, such as snakes, toads, rats and mice, and similar unclean creatures, crawl over the bed or the person. Voices predicting evil, or bringing messages of remorse, or uttering threats of punishment, are heard. The patient may seem violent, and may even attack his attendants, but the violence is that of terror, and not of aggression. The attack is an attempt at defense. There is great insomnia, and usually when the patient can be made to sleep the mind is clear after the awakening. This is not, however, invariably the case. I have seen delirium tremens gradually pass through successive days of wakefulness and nights of sleeping into a chronic mania not readily to be distinguished from that arising from other causes. In the earlier attacks of delirium tremens occurring in very robust people, when all the mucous membranes are irritated, and when probably there is direct irritation of the brain and its meninges, there may be a slight febrile reaction and even a strong and excited pulse; but the disease is typically asthenic, with loss of muscular power, tremulousness, and rapid, feeble pulse, and when death occurs it is from exhaustion. Sometimes the patient suffering from delirium tremens has sufficient rationality to receive his physician with a quiet, gentle courtesy, and to answer questions without irritation. It will be noted, however, that he is evidently preoccupied, and that occasionally he turns his head or casts furtive glances from one part of the apartment to the other, and a little finesse will reveal the fact that during the whole time he is seeing visions or hearing sounds, or is at least laboring under a profound apprehension of attack.

An almost characteristic form of insanity occurring especially in married chronic drinkers is that of conjugal infidelity. This form of mental derangement is as singular, but none the less true, as that of lying in opium habitués. Thus, according to Wood,† the prolonged use of alcohol may lead to a gradual functional and finally structural alteration of the nervous system. Under the continuous influence of the narcotic the brain performs its functions slowly and imperfectly and the mental movements become sluggish and weak; the memory is greatly impaired; the power of fixing the attention steadily diminishes, but the intellectual weakness is especially shown by the lessening of the power of the will, so that not only is the judgment uncertain, but its dictates are not carried out. There is also a distinct tendency to emotional depression, and often a peculiar suspiciousness, which is the groundwork for delusions. A step further, and hallucinations haunt the victim. The route to insanity and irresponsibility from this condition is short. Out of such a state is easily developed the most characteristic and frequent form of alcoholic insanity, namely, that with depressive delusions. In some cases this variety of alcoholic insanity appears suddenly with symptoms for a time not to be distinguished from delirium tremens. Indeed, I think it perfectly correct to say that a patient may pass from delirium tremens into alcoholic insanity.

It is affirmed that headache and other symptons of sudden congestion of the brain occasionally usher in the attack of alcoholic insanity. When the symptoms are active hallucinations are very numerous, constantly changing, and almost always are such as to inspire terror or disgust. In a very short time they are accompanied by

* *Loc. cit.*, pp. 465, 466.

† *Loc. cit.*, pp. 467, 468.

delusions of persecutions, voices of reproach, threatening, or remorse, mocking faces, unclean beasts, tormenting devils. These and similar visions drive the victims into profound melancholy, and finally may lead to suicide or murder. According to Spitzka, the delusions of chronic alcoholism almost always relate to the sexual relations or to poisoning. Underlying this variety of alcoholic mania is frequently an intense fear, which may lead to violence, as when a man kills his wife because he fears that she will poison him. Not uncommonly the depressive sexual delusion leads to an outburst of uncontrollable jealousy and rage, so that the wife-murder from motives of jealousy is not a rare result of alcoholic mania. There is in some of these cases a very marked relation between the presence of alcohol in the blood and the insane outburst. The drunkard may be, when not under the influence of the poison, fairly rational, but is converted by alcohol into a wild beast, although he has few or none of the ordinary symptoms of intoxication. The man may walk straight and talk rationally on general subjects but be profoundly under the influence of a depressive or persecutive delusion, which disappears when the blood is free from alcohol. The relation between depressive alcoholic insanity and *mania a potu* is, as has already been stated, very close. Insomnia, emotional excitement, especially connected with fear, hallucinations, and delusions are common to each; but the tremors are more marked in delirium tremens, and when an attack of alcoholic insanity is acute and tremors are pronounced it may be considered to be *mania a potu*. Lentz* calls attention to a form of alcoholic insanity with expansive delusions and hallucinations of sight and hearing which, very strangely, in most instances relate to God and a future state. Visions of supernatural beings, and especially of the Deity bathed in an aureola of light, perpetually haunt the patient; the ministrations of angels seem to bring relief, or, mayhap, the voice of God himself is heard in command or instruction. It would appear that two forms of alcoholic insanity must be recognized, one a lypemania, or melancholia with delusions of persecution; the other a megalomania, with a strong tendency to religious hallucinations.

A form of disease induced by the continued use of alcohol is that of epilepsy. This is apt to occur in previously healthy individuals as well as in those born of parents who have been hard drinkers.

In speaking of the subject Wood† says: "There are two distinct epileptic conditions produced by intoxicating drinks. In one of these the convulsions are symptomatic of acute poisoning, and come on during an orgy, or immediately after a single excessive draft of liquor. In the second form these convulsions are apparently not the immediate result of alcohol in the blood, but are developed at a time when the system is not profoundly under the direct influence of the poison. These epileptic convulsions may supervene during delirium tremens, when they are accompanied by hallucinations; during the mental enfeeblement of profound chronic alcoholism, when they are associated with dementia, paralysis, or stupor; or at a time when the general symptoms of chronic alcoholism are not pronounced. In the alcoholic convulsion the symptom may closely resemble those of true epilepsy, and not rarely the attack is ushered in by headache, gastric embarrassment, troubles of vision, excessive tremors, or some similar prodrome which may be looked upon as partaking of the nature of an aura. The convulsions usually occur in paroxysms, two, three, four, or more, one after the other, at intervals of a few minutes.

"Not only may major epilepsy be closely simulated by the alcoholic affection, but simple epileptic vertigo or true *petit mal* may exist, either alone or associated with the major convulsions.

"Alcoholic epilepsy is often associated with hallucinations, especially of terror, and the convulsion is not rarely followed by temporary mental derangement, which may last only for a few minutes or may continue for hours or days. The mental derangement may take the form of an acute dementia, in which the intellectual functions seem to be in abeyance, and the subject is reduced to the condition of an

*De l'Alcoolisme, p. 491.

†Nervous Diseases and Their Diagnosis, p. 117, 1887.

automaton, obeying immediately and mechanically all commands and impulses from without. This state of perverted consciousness has, in some instances, lasted for days. Suicidal impulses are very frequent."

All this has been corroborated frequently by cases reported in the various journals. Demme,* in cautioning against the common practice of allowing children the habitual use of alcoholic beverages as appetizers, reports several cases of organic and functional disease produced by such a habit. He has met two cases of cirrhosis of the liver in early life due to this cause. Five cases of infantile epilepsy were induced by the use of alcoholic beverages, and in addition to these he could trace 21 out of 71 young epileptics to parents who were drunkards. He also believes that alcohol taken in early life is a prominent factor in the production of night terrors and chorea in some cases.

Dodge † reports a case of alcoholic epilepsy in a woman 34 years of age. The convulsions were precisely of the first kind described by Wood. A similar case is referred to by Griffith and Cattell. ‡

But I will not continue to treat a subject that ought not to be considered, strictly speaking, within the limits of this essay.

The influence of alcohol in the production of epilepsy can not be denied. Thus, for instance, Drouett § attributed the disease in 45 out of 445 cases of alcoholism in men to alcohol alone. He observed the same malady in 9 cases out of 89 female alcoholics. Echeverria,‖ who analyzed 572 cases of epilepsy, found that of this number 257 cases could be directly and solely traced to alcohol as cause and effect. Again, Moeli ¶ concludes, from a careful study, that from 30 to 40 per cent of all persons affected with delirium tremens are victims of epilepsy.

The same may be said regarding the occurrence of the disease in children of alcoholic parents. Martin** has published an interesting report of this class of cases. His observations were made in La Salpétriere. Out of 150 cases of insane epileptics in children, he found 60 in which a history of alcoholism in the parents was clearly defined.

Alcohol poisoning does occur, and whether in the acute or chronic form it often produces death *per se*. In many cases a fatal issue has been preceded by convulsions.†† How death is caused by alcohol has not been very accurately determined. It is certainly often produced by failure of the respiration. Such an observation, at least, I have myself frequently made in the course of my experimentation upon the lower animals.

But the actions of alcohol are so varied that I will endeavor to study them on the different systems separately.

ON THE NERVOUS SYSTEM.

On the peripheral nerves.—When a small amount of alcohol, say about 5 drops well diluted, is injected hypodermatically into a common frog (*Rana esculenta*), there are produced phenomena of general excitability, as is evinced by restlessness of the animal; somewhat, though not always, hurried respiration, slightly increased reflexes, and acceleration of cardiac action. These effects soon pass off and the batrachian resumes its normal condition. That alcohol, in minute quantities, does excite the peripheral nerves, appears to be demonstrated by the results of the following experiments:

Experiment I.—Took a medium-sized frog. Ablated cerebrum, and after shock had passed, reflex action, as tested with acidulated water, was manifested in twelve

* Journ. Amerc. Med. Association, 1887; also Annual of the Universal Medical Sciences, 1888.
† Medical Register, December 8, 1888.
‡ Annual of the Universal Medical Sciences, 1890.
§ Annales Méd. Psychologique, 1875.
‖ Journal of Mental Science, January, 1881.
¶ Neurolog. Centralblatt, 1885.
** Annales Méd. Psychologique, January, 1879.
†† Philadelphia Medical Times, VI, p. 463.

seconds. Injected under the skin 5 drops of alcohol well diluted with water, at 12 m.; 12:15 reflex action in ten seconds; 12:20 reflex action in ten seconds; 12:30 reflex action in eight seconds; 12:50 reflex action in ten seconds.

Experiment II.—Medium-sized batrachian. Destroyed brain; tied the blood-vessels of right leg and waited for the disappearance of shock. Reflex action was then tested as in previous experiment. It was manifested in both legs in ten seconds. Gave hypodermatically, at 10 a. m., five drops of alcohol diluted with water; 10.20 reflex action in left leg in six seconds; in right leg in ten seconds; 11.20 reflex action in both legs in thirteen seconds.

When the abdominal aorta had been tied previous to the administration of the drug, no modification in the reflex function was observed upon the lower extremities.

If the alcohol is applied to the nerves in small doses, the same slight excitability is noticed, as proven by the experiment that follows, an example of many others performed:

Experiment III.—Destroyed cerebrum of a large frog, and exposed the right sciatic nerve. After shock had passed off, a feeble current of electricity applied to the nerve trunk by means of a Dubois-Reymond apparatus, produced at 15 cc. between coils, contraction of the tributary muscles. At 9.15 a. m. gave five drops of alcohol subcutaneously. 10.15 distinct contractions are elicited in the corresponding muscles, at 20 cc. between coils; 10.25 the same result at 30, at 35 and at 40 cc. between coils.

These results are confirmatory of those previously obtained by Mommsen.* This investigator found that alcohol, when placed in contact with them, distinctly increased the excitability of the peripheral motor nerve fibers.

On the other hand, there is no doubt that large and toxic doses of the drug cause depression and paralysis of the peripheral nerves. I have frequently observed that, after death of frogs killed by alcohol, the nerves respond to electrical stimulation very slightly or not at all, these variations depending upon the quantities of the drug used. Wood† has found that the vapor of alcohol is capable of producing the stupor known as anæsthesia and further that this anæsthesia may be deepened into death accompanied by all the phenomena of fatal ether narcosis. The following experiments explain themselves:

Experiment IV.—Large frog. Injected hypodermatically 5 c. c. of a 25 per cent solution of alcohol at 1:20 p. m.; 1:30 the animal shows no disposition to move about; respiration slow; apparently in a stupid condition; 1:45, movements exceedingly sluggish, greatly diminished reflexes. Died eventually from respiratory failure. After death, nerves and muscles responded weakly to electrical irritation.

Experiment V.—Medium-sized frog. Destroyed brain, and after shock had passed away, tested reflexes by means of acidulated water. Reflex action was manifested in ten seconds. Gave at 1:50 p. m. 5 c. c. of a 25 per cent solution of alcohol; 2:00 reflex action in fifteen seconds; 2:10, reflex action in twenty-five seconds. The reflexes continued to diminish until they were finally abolished.

Similar results have been obtained by Dogiel ‡ who found the reflex susceptibility at first, somewhat, and afterwards decidedly, decreased by large amounts of alcohol; and that the same effects of depression were produced on both the motor and sensory nerves.

Again, there is scarcely any doubt that in large quantities the effects produced by alcohol on the peripheral nerves are accompanied by alterations in the nerve tissue itself, and both in the gray and the white substance. In regard to the latter, and particularly in reference to the peripheral nerve filaments, the results of experimentation shows this to be the case. It could not, indeed, be otherwise, judging

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*Arch. f. Patholog. Anatom., LXXXIII, 243.

†Therapeutics: Its Principles and Practice, eighth edition, 1891.

‡Pflüger's Archiv., Bd. VIII, p. 605, 1874.

from the very decided action of the drug. Thus Jackimoff* has made, in the laboratory of Merzefewski, an experimental study of the nervous changes following the action of alcohol. The author divided his research into three series, giving the drug to puppies and dogs in the strength of 40 per cent. The alcohol was administered in the first series, in gradually ascending doses of from 1 to 8 cubic centimeters (16 grains to 2 drachms) for each kilogram of the animal's weight, until death was produced. In the second series the author so gave the drug during the period of a month as to produce an acute intoxication which resulted in the death of the animal; while in the third series of his experiments an acute drunkenness was caused.

There was observed, resulting from the first series of experiments, a gradual paralysis of the hind legs, preceded by languor, muscular relaxation, accompanied with general hypersthesia and tenderness of the nerve trunks. Death was caused in from five to eight months. No post-mortem lesions were observed in any of the organs, and, singularly enough, nothing abnormal was exhibited by the peripheral nerves under the microscope, while changes in other portions of the nervous system, as will be noticed presently, were distinctly seen. Why changes in the nerves were not observed, as in other parts of the nervous system, is not clearly made out, and can only be explained by some error committed in the microscopical examination. In fact, Jackimoff himself seems to admit this latter issue, since changes in the trophic cells could not occur without producing atrophy of the tributary elementary fibers. When the animals received the drug according to the second method, similar changes, although to a less marked degree, were observed.

Spaink† has studied and endeavored to determine the action of ethylic alcohol, when given for a long time, particularly upon the peripheral nerves. He used in his experiments rabbits, and injected the drug, well diluted, by means of an æsophageal sound. Immediately after death of the animal, the auricular, the tibial, and the pneumogastric nerves were taken out. These the author placed, for hardening purposes, in either Fleming's or Erlich's liquid, some of the nerves being stained by means of various reagents. The investigator was thus able to determine the degeneration of the peripheral nerve fibers, and found an especial modification of the axis cylinder, that is, a spiral twisting of this element, corresponding precisely to the direction of the degeneration of the fiber.

On the higher nerve centers.—That alcohol exerts a powerful influence upon the brain and other centers has been so thoroughly established clinically and experimentally that the subject would not need further discussion. It may be said, nevertheless, that mild doses of the drug produce a primary stimulation of the cerebrum, and thus increase the rapidity, although perhaps not the depth of thought. Upon the spinal cord, as well as upon the muscles and nerves, alcohol augments at first the reflex activity. Large amounts cause a loss of coordination, this being the result of an action upon the brain and the lower nervous system. Under such circumstances the power of touch is partly destroyed, and it has been found that this loss of coordination is mainly due to paralysis of the sensory functions. Thus Kraepelin,‡ in an especial research on the cerebral action of certain medicaments, has found that alcohol in small doses impairs the sensory functions and excites the motor ones and that, on the other hand, in large amounts the drug first aids the motor processes and finally abolishes them. The loss of coordination "makes a drunken man," as Hare§ has so tersely expressed it, "fail to recognize the surface of obstructions and the impaired mental power and disordered judgment, combined with the badly acting motor and sensory paralysis, cause him to stumble and fall."

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* Bull. de la Soc. d'Anthroplog. de Paris, v. 7, p. 72, 1890.

† Journ. de Med., de Chirurg. et de Pharmcol. de Bruxelles, October 5, 1890.

‡ Riforma Medica, July 11, 1892.—British Medical Journal, August 27, 1892.

§ Practical Therapeutics: Third Edition, 1892.

As in the case of the peripheral nerves, alcohol produces lesions of the brain, the spinal cord, and the corresponding membranes. Jackimoff[1] observed that if the constant acute intoxication of the third stage or series of his experiments be persisted in, death took place in from thirty to thirty-two days, and the post-mortem examination disclosed the lesions just mentioned. The microscope revealed great hyperæmia of the gray matter of both the brain and the spinal cord, extending into the adjacent white substance. It was noticed that in all instances the degeneration was an ascending one, decreasing in severity, however, as it proceeded. The chief lesion was found in the lumbar enlargement of the medulla spinalis.

ON THE CIRCULATION.

The influence which alcohol exercises on the circulation is extremely interesting and of the utmost importance. Without putting aside a study of the actions of alcohol on other parts of the economy, it is my purpose to make a special and thorough investigation of its influence on the circulatory apparatus, from the fact that in this there exists a great deal of contradictory evidence. I will first examine the literature of the various observations made so far, and then discuss the results of my own experiments.

Quite recently Gutnikow[2] has undertaken a series of experiments on curarized dogs. To these animals, under such conditions, he administered alcohol in ascending doses. The results obtained led the author to conclude that alcohol produces a diminution of the arterial pressure, due to depression of the vaso-motor centers; that the drug enhances the work of the heart, and that it does not influence the pneumogastric nerves. While I agree with these results, I question the action of alcohol upon the vaso-motor system. In fact, in curarized animals not very accurate results can be obtained through the action of any drug, the effects being vitiated by an influence of the curare itself. This agent is mainly given to set aside whatever influence respiration may have upon the blood-pressure, and since curare itself exercises an influence on the nervous mechanism of circulation, under such circumstances, the action of other drugs can not be entirely relied upon. In other words, the action of a drug in curarized animals can not be said to be exerted upon this or that part of the nervous mechanism which controls the circulatory system. But I will discuss the matter later.

In the sphygmographic studies made by Parkes and Wallowickz[3] on healthy men, it was found that the pulse was increased in both force and rapidity; but no distinct indications of increased blood pressure were seen. Zimmerberg[4] states that alcohol reduces both the rate and force of the pulse, and that after division of the pneumogastrics the force and rapidity remain the same, but the arterial pressure is diminished. This author, however, employed toxic doses, his experiments being made on the lower animals. Dogiel,[4] who used small quantities, has observed at first an increase of cardiac rate, followed by a decrease of the same. The pressure was also raised from the beginning, and then diminished, accompanied during this stage by a secondary increase of the pulse-rate. The investigator further noticed that under this latter condition the vaso-motor centers were paralyzed, since they did not respond to stimulation. He believes that the accelerator fibers (?) are stimulated. The author does not, unfortunately, detail his experiments, and, therefore, his studies are unsatisfactory.

Castillo[5] obtained similar results in the experiments performed on frogs and rabbits. In these latter animals he found small doses of alcohol to produce a marked

[1] *Loc. cit.*

[2] Zeits. f. Klinish. Med., B 21, p. 153, 1892.

[3] Effects of Alcohol on the Human Body.

[4] Quoted by Wood in his Therapeutics.

[5] Philadelphia Medical Times, Vol. XI, October, 1880.

increase of the arterial pressure, followed by a distinct fall, especially when the dose of the medicament was augmented. The pulse was likewise increased in both rate and force. These phenomena were not prevented by previous section of the vagi, of the accelerator nerves, or of the spinal cord. The author, therefore, concluded that the changes described were due to a direct action of alcohol upon the cardiac viscus. These statements appear to be further corroborated by the results of his experiments made upon the isolated heart of the batrachian.

Martin,[1] from the results of an extended series of experiments, arrives at conclusions almost diametrically opposed to those of the investigators above referred to. His research was carried with a view to ascertain especially the action of alcohol upon the heart of the dog. He isolated the organ by a quite complicated method, invented by himself. The experimenter used different strengths of alcohol, and found that blood containing one-eighth per cent of the drug by volume had no immediate action on the isolated heart; that blood containing one-fourth per cent diminished within one minute the work done by the heart; and that blood containing one-half per cent of alcohol always diminished the work of the heart at once. It was observed that if the pericardium be cut away, this procedure prevented the action of even one-half per cent of alcohol. The author ventures to explain this phenomenon by stating that alcohol so relaxes the cardiac muscle that there is no room in the pericardium for a full diastole, the relaxed heart being, even in its systole, about sufficiently large to fill the pericardium.

Hemmeter[2] (1), employing Martin's method of experimentation, has obtained similar results. He found that the work of the isolated heart of the mammalian is distinctly lessened by alcohol. The results obtained by these two investigators can not be satisfactorily explained. Hemmeter suggests that they may be due to alteration produced by the alcohol in the defibrinated blood, but certainly this does not suffice, and I, for the present, entirely agree with Wood, who states that "certainly the procedures are attended by so much shock as to seriously affect, and probably paralyze, the cardiac nerve-centres. Whatever the explanation may be, it is evident that the action of the alcohol upon the isolated heart is very different from what it is in the normal dog or man, since Hemmeter has shown that, during these experiments, under the influence of the alcohol, intracardiac regugitant murmurs are developed and hemorrhages occur into the cardiac tissue."

The more recent studies of Eagleton[3] do not confirm the results of Martin and Hemmeter. Eagleton, by a continuous injection of alcohol into the circulation, found that small doses, frequently repeated, increased both cardiac force and arterial pressure; that large amounts at first increased, then diminished, blood-pressure, followed by a rise to the normal height, and, finally, by a progressive fall of pressure until the occurrence of death; that at the same time, the frequency of the heart's beat is at first decreased, though there is sometimes a primary increase; that the pulse then partly returns to the normal rate, and is subsequently decreased. He also found that strong alcohol in minute quantities generally increased the cardiac force and the pulse-rate. On the other hand, large amounts of alcohol decreased at once the rate and the force of the cardiac beat, accompanied by a diminution of the blood-pressure. These phenomena were the result of a direct action of the drug upon the heart, since they were observed similarly after the organ had been previously isolated from all nervous connection. Therefore, the author concluded that alcohol, in small doses, is a cardiac stimulant; in large amounts, a cardiac depressant.

Eagleton, then, agrees with the observations of most previous experimenters, with the exception of Martin and Hemmeter, and his results sustain the common clinical belief that small amounts of alcohol increase the force of the circulation.

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[1] Maryland Medical Journal, p. 289, September, 1883.

[2] Johns Hopkins Univ. Stud. Biol. Labor., p. 225, Novem., 1889.

[3] University Medical Magazine, September, 1890.

Miessner,[1] who experimented on mice and rabbits with allylic alcohol, has shown that this substance produces violent irritation of the mucous membranes, accompanied with great dilatation of the blood vessels and consequent lowering of the arterial pressure. In his experiments death was caused by allylic alcohol, through respitory failure, preceded by dyspnœa and convulsions. Narcosis, however, was not produced by this agent.

An interesting preliminary study of the actions of the alcohols belonging to the ethyl and aromatic series has been published by Gibbs and Reichert.[2] The authors examined propylic, iso-propylic, butylic, iso-butylic, heptylic, octylic, allylic, benzylic, and cuminic alcohols. The results of their experiments upon animals, show that the actions of these various substances are essentially of the same character, though differing in degree. Ethylic alcohol, which may be taken as a type of the ethyl series, was carefully studied and its actions on the circulation and the respiration are thus summarized: Small doses increase the frequency and force of the cardiac beat, increase the arterial pressure, and increase the respiratory movements; large doses generally decrease, but sometimes increase the pulse-rate, primarily increase and then lower the arterial pressure, and increase the respirations; very large doses depress pulse, pressure and respiration. The changes in the heart-beat are due to direct actions on the heart, the increase of pressure is also due to a direct action on the heart. The decrease of pressure is due to a depression of both the heart and vaso-motor apparatus. The primary increase and final decrease in the respiratory-rate are due to a stimulation and subsequent depression of the respiratory centers. The authors are led to believe that the actions of the other alcohols examined are identical with those of ethylic alcohol, the differences being essentially in degree, and increasing with the acquisition of each radicle; in other words, the higher the alcohol in the series the greater its toxic power. The actions of the benzylic and cuminic alcohols, which belong to the aromatic series are apparently the same as those of the others.

The results obtained by Gibbs and Reichert are, generally, in accord with those noted by previous investigators, and with my own, as will be observed presently.

It must be admitted that many observers have seen depressant effects caused by alcohol even when ingested in small quantities. It will be sufficient for me to mention the names of Lauder Brunton, Hammond, Hervier, and Saint Layer, Fife, Lehman, Perrin, Richardson, Smith, and Vierordt, the work of all of whom has been examined and reviewed by MacDowel Cosgrave.[3] In all these studies it is stated that alcohol produces from the first a narcotic rather than a stimulating effect.

The statements made by these latter high authorities deserve, certainly, the most serious consideration; yet I believe that the scale of experimental evidence is inclined towards a stimulation, rather than a narcosis produced by alcohol, especially when moderate amounts of the drug are carefully used.

I will now examine the results of my own experiments, studying the effects of alcohol on the pulse, both of the isolated heart of the frog and that of the dog, and upon the blood-pressure, *seriatim*. The warm-blooded animals used by me in the experiments to be presently described were exclusively dogs.

On the heart; the pulse.—I prepared different solutions of alcohol of the strength of 0.5, 1 and 2 per cent respectively. In these solutions I would place the isolated hearts of frogs and compare their activity with that of others placed in simple solutions of chloride of sodium. For example, two hearts were put first in the salt solution, and their beats counted. One of the hearts was then taken out carefully and placed in the alcoholic solution, alongside of the other and their beating carefully observed. I will detail the following experiments:

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[1] Berl Klin. Wochens No. 33, and Edinburgh Med. Journal, November, 1890.

[2] American Chemical Journal, No. 6, Vol. XIII, 1891.

[3] Dublin Journal of Medical Sciences, September, 1891.

EXPERIMENT VI.

[In this experiment the hearts were beating at the rate of 48 per minute.]

Alcoholic solution, 0·5 per cent.		Chloride of sodium, normal.	
Time.	Pulse.	Time.	Pulse.
10:30	58	10:31	48
10:32	60	10:33	48
10:35	64	10:36	48
10:37	62	10:38	46
10:45	60	10:46	44
10:50	50	10:51	43
11:00	48	11:01	40
11:10	22	11:15	38
11:30	14	11:32	36
11:36	8	11:38	26
11:40	Heart stopped in diastole.	11:40	24
		11:50	8
		11:58	Heart stopped.

EXPERIMENT VII.

[The hearts were beating in the salt solution at the rate of 52 per minute.]

Alcoholic solution, 1 per cent.		Chloride of sodium, normal.	
Time.	Pulse.	Time.	Pulse.
11:15	60	11:17	52
11:20	60	11:21	52
11:25	58	11:27	50
11:35	48	11:41	40
11:45	42	11:47	36
11:50	30	11:53	38
11:55	22	11:58	36
12:00	10	12:02	32
12:05	4	12:09	30
12:08	Heart arrested in diastole.	12:11	28
		12:16	26
		12:20	12
		12:30	4
		12:35	2
		12:43	Heart ceased.

EXPERIMENT VIII.

Alcohol solution, 2 per cent.		Chloride of sodium, normal.	
Time.	Pulse.	Time.	Pulse.
12:20	56	12:22	58
12:24	58	12:26	58
12:29	50	12:32	56
12:33	48	12:38	56
12:40	40	12:42	52
12:45	30	12:47	52
12:50	15	12:52	52
12:58	4	1:00	48
1:03	Stopped.	1:10	36
		1:25	20
		1:35	8
		1:46	Arrested.

In Experiment VI the pulse was increased 10 beats above the normal, within a short time, and thus continued, with slight variations, for a period of 25 minutes; the pulse then returned to normal, and was afterwards decreased gradually until the heart was finally arrested in diastole.

The same results, although to a less marked degree, were observed when 1 and 2 per cent solutions of alcohol were used, as in Experiments VII and VIII. In these an increase of 18 and 12 beats per minute, respectively, was also noticed, lasting for about 20 minutes. The pulse, then, gradually began to decrease until its final cessation, this occurring in about 38 minutes longer. In both experiments the heart continued to act in the salt solution for a longer time (from 18 to 35 minutes), but at no time was there an action above the normal produced.

A very dilute solution of alcohol, say 0.1 per cent, has no perceptible action upon the pulse, as is shown in the following experimental record:

EXPERIMENT IX.

Alcoholic solution, 0·1 per cent.		Chloride of sodium, normal.	
Time.	Pulse.	Time.	Pulse.
10:40	62	10:42	66
10:45	60	10:47	66
10:50	58	10:52	64
10:55	52	10:57	60
11:05	40	11:06	58
11:15	32	11:18	50
11:20	8	11:25	16
11:28	Stopped.	11:30	16
		11:35	12
		11:48	Stopped.

It is thus observed that, although very dilute alcohol does not apparently influence the action of the heart of the frog, small amounts of the drug do increase the rapidity of the cardiac beat, this phenomenon being eventually followed by a depressant effect if the action of the drug be continued. Large doses diminish from the first the pulse rate.

The same effects, that is, those of stimulation by small doses and of depression by large or toxic quantities, are observed in the heart of the dog. In these instances I have employed the drug in small repeated doses, given at short intervals, or in continued injection, following the method of Eagleton. The agent has been used in the strength varying from 20 to 25 per cent. In this manner coagulation of the blood was prevented to a very considerable extent.

In all these experiments the drug was injected into the general circulation, through the external jugular or femoral vein, while the carotid or femoral artery was connected with the recording kymograph.

The following normal experiments are appended:

EXPERIMENT NO. X.

[Dog; weight, 6.12 kilos.; normal.]

Time.	Dose.	Pressure.	Pulse per minute.	Respiration per minute.	Remarks.
m. s.	*c.c.*	*mm.*			
0 00	.....	150	148	20	Alcohol, 25 per cent used.
30	10	150	148	20	Injection begun.
1 00	.....	168	164	18	Injection ended.
45	.....	168	160	18	
53	.....	165	166	18	
2 00	.....	162	166	18	
30	15	158	152	18	Injection begun.
50	.....	160	160	15	Injection ended.
3 20	.....	166	162	18	
50	.....	162	158	12	Eye reflexes still good.
5 10	.....	150	152	16	
40	20	.....	.....	.....	Injection begun.
6 00	.....	154	162	18	Injection ended.
8 00	.....	158	170	18	
13 00	.....	152	166	12	
16 00	.....	142	142	14	Dog whines.
20 00	.....	150	146	16	Dog struggles.
22 30	.....	142	132	12	Quiet again.
25 00	.....	125	114	10	Respiration shallow.
32 00	.....	118	148	12	
40 00	.....	98	86	8	Animal was eventually killed with chloroform.

EXPERIMENT NO. XI.

Dog; weight, 8.16 kilos; normal.

0 00	.....	175	140	20	Alcohol, 25 per cent used.
1 30	20	175	142	20	Injection begun.
2 00	.....	180	150	20	Injection ended.
45	.....	180	152	20	
3 30	.....	180	160	18	
4 30	.....	182	160	18	
9 30	25	180	158	16	Injection begun.
10 00	.....	182	162	18	Injection ended.
12 30	.....	188	.....	16	Dog whines and struggles.
13 30	.....	182	154	18	Animal quiet again.
18 30	.....	160	138	16	Eye reflexes gone; respiration shallow.
20 00	30	162	142	12	Injection begun.
30	.....	158	132	12	Injection ended.
23 45	.....	140	112	16	
28 45	.....	112	98	20	Dog snores.
33 00	.....	96	82	8	Hind legs rigid; snores deeply.
35 00	.....	.....	.....	.....	Clot for 8 minutes.
48 00	.....	72	68	22	Respiration quite shallow.
50 00	.....	65	52	26	Respiration very shallow.
58 00	.....	80	112	16	Killed with chloroform.

EXPERIMENT NO. XII.

[Dog; weight, 9.9. kilos; normal.]

0 00	.....	160	148	16	Pure alcohol employed.
1 45	2	160	148	16	Injection begun.
2 00	.....	165	156	20	Injection ended.
3 30	.....	170	162	18	
5 45	.....	172	168	22	Dog whines and struggles.
8 30	.....	168	152	26	Respiration shallow.
10 30	5	162	152	24	Injection begun.
11 00	.....	172	166	20	Injection ended.
30	.....	178	180	22	Eye reflexes weak.
15 00	.....	162	148	18	
18 30	.....	152	128	18	Dog whines; eye reflexes gone.
22 30	.....	146	112	20	
28 30	10	142	116	18	Injection begun.
29 00	.....	120	80	12	Injection ended; dog struggles.
31 00	.....	130	118	18	
35 00	.....	128	120	18	Breathing shallow.
40 00	.....	116	82	26	Breathing very shallow; almost imperceptible.
42 00	.....	82	132	26	Pulse small.
45 00	.....	.....	.....	.....	Dog died suddenly; respiration and heart ceased simultaneously.

EXPERIMENT NO. XIII.

[Dog; weight, 8.3 kilos; normal.]

Time.	Dose.	Pressure.	Pulse per minute.	Respiration per minute.	Remarks.
m. s.	*c. c*	*mm.*			
0 00	.....	132	140	24	Alcohol, 20 per cent used. Continuous injection employed. Vagi prepared.
2 00	.....	132	140	24	Injection begun.
5 00	.....	138	152	22	
8 00	.....	142	158	24	
10 00	.....	138	166	18	Has had 50 c. c.
12 45	.....	128	142	16	
15 00	.....	122	142	18	
20 00	.....	128	132	18	Has received 155 c. c.
22 30	.....	.....	.....	.....	Clot for 5 minutes.
28 45	.....	130	138	26	Injection begun anew.
32 30	.....	124	112	16	Eye reflexes weak; respiration labored.
37 00	.....	122	128	12	Has had 235 c. c.
39 45	.....	126	136	18	Applied electrical current to vagi; heart inhibited immediately.
40 00	.....	52	.....	.....	
41 00	.....	108	.....	38	
52 00	.....	112	124	12	Has had 320 c. c.; snores deeply.
55 00	.....	82	96	8	Respiration labored; muscular rigidity of extremities; eye reflexes gone.
58 00	.....	.....	.....	.....	Died from respiratory failure.

EXPERIMENT NO. XIV.

[Dog; weight 8.9 kilos; normal.]

0 00	.....	138	182	32	Alcohol 25 per cent used. Continuous injection employed. Crural and sciatic nerves prepared.
1 00	.....	138	184	32	Injection begun.
3 20	.....	142	192	28	
5 30	.....	144	198	24	
8 45	.....	128	178	24	Has had 140 c.c.
9 30	.....	118	168	22	
13 30	.....	122	170	16	Has received 225 c. c.
15 00	.....	.....	.....	.....	Clot for 6 minutes.
22 00	.....	.....	166	28	Dog snores; eye reflexes absent.
25 30	.....	118	168	18	Has had 260 c. c.
28 00	.....	118	162	16	Stimulated crural nerve with electrical current; blood pressure 122.
32 00	.....	118	158	14	Muscular rigidity; respiration difficult; alcohol stopped. Had received 325 c. c.
38 00	.....	98	112	14	Strong electrical current to sciatic nerve, blood pressure 106.
46 00	.....	.....	.....	.....	Animal died from failure of the respiration. Heart ceased in diastole.

EXPERIMENT NO. XV.

[Dog; weight, 5.12 kilos; normal.]

0 00	.....	138	170	38	Pure alcohol used.
1 30	1	138	170	38	Injection begun.
2 30	.....	142	178	30	Injection ended.
4 00	.....	142	178	32	Struggles and whines.
7 30	.....	158	182	32	
19 45	2	148	170	28	Injection begun.
11 00	.....	150	172	28	Injection ended.
15 30	.....	140	168	14	Eye reflexes weak.
17 00	.....	140	162	16	
25 40	3	138	158	14	Injection begun.
26 00	.....	130	114	.....	Injection ended.
27 45	.....	120	100	14	Eye reflexes gone; respiration difficult.
31 20	.....	120	102	12	Produced asphyxia by closing trachea tightly.
33 30	.....	140	98	.....	
35 00	.....	142	82	.....	
38 09	.....	.....	.....	.....	Dog killed with chloroform.

EXPERIMENT NO. XV*a*.

[Dog; weight, 9.5 kilos; normal.]

Time.		Dose.	Pressure.	Pulse per minute.	Respirations per minute.	Remarks.
m.	*s.*	*cc.*	*mm.*			
0	00	.....	145	162	22	Pure alcohol used.
1	30	10	145	162	22	Injection begun.
2	00	.....	140	162	18	Injection ended.
2	45	.....	132	150	18	
3	30	15	128	140	20	Injection begun.
4	00	.....	126	138	18	Injection ended.
5	30	.....	98	102	12	
7	00	.....	80	.....	.....	Struggles.
8	30	.....	68	92	6	Alcoholized; reflexes almost gone.
9	00	.....	52	80	6	Clot for five minutes.
15	00	.....	40	68	4	Respiration slow and shallow.
22	00	.....	28	52	4	Pulse weak.
23	30	.....	22	50	.....	Pressure going down very fast.
24	45	.....	.....	.....	.....	Died from respiratory failure.

It is thus seen from the foregoing experiments that small doses of alcohol increase the rapidity of the pulse. This increase is usually accompanied by a corresponding rise of the arterial pressure. If during the experiment an electrical current is applied to the central or peripheral end of a cut vagus, inhibition of the heart is immediately produced (see Experiment XIII), a fact of great significant importance.

I shall now proceed to study how this rapidity of the pulse is brought about. As in the case of normal animals, in curarized dogs small doses of alcohol, ingested at short intervals, cause an increase in cardiac rate. In larger amounts, however, there is sometimes an increase, followed by a decrease, sometimes a diminution from the onset followed by an increase and then by a decrease; while in either instance the blood pressure is elevated, sometimes remains unaltered, or falls if the dose of the agent be sufficiently toxic.

I find that the same stimulating effect upon the cardiac beat is caused by small doses of alcohol, when the pneumogastric nerves have been previously divided, and similarly when the cardiac viscus has been isolated from all nervous connection by previous section of both vagi and the spinal cord.

An examination of the following records sustains these statements:

EXPERIMENT NO. XVI.

[Dog; weight, 6.8 kilos; curarized.]

Time.		Dose.	Pressure.	Pulse per minute.	Respirations per minute.	Remarks.
m.	*s.*	*cc.*	*mm.*			
0	00	.....	128	120	.....	Pure alcohol used; artificial respiration employed.
10	00	1	126	122	.....	Injection begun.
	30	.....	128	120	.....	Injection ended.
12	00	.....	134	132	.....	
18	30	.....	138	136	.....	
22	45	.....	136	138	.....	
23	00	.....	132	128	.....	
26	40	.....	132	128	.....	
29	00	1	132	128	.....	Injection begun.
29	30	.....	132	126	.....	Injection ended.
32	00	.....	134	134	.....	
34	00	.....	128	128	.....	
42	00	.....	120	126	.....	
44	30	.....	112	118	.....	
46	00	.....	112	142	.....	Pulse very small.
52	00	.....	.....	.....	.....	Killed with chloroform.

EXPERIMENT NO. XVII.

[Dog; weight, 8.3 kilos.; curarized.]

Time.	Dose.	Pressure.	Pulse per minute.	Respirations per minute.	Remarks.
m. s.	*cc.*	*mm.*			
0 00		142	165		Alcohol pure employed; artificial respiration.
8 30	2	142	168		Injection begun.
9 00		142	172		Injection ended.
11 30		144	152		
13 45		142	176		
15 00		146	178		
16 00	3	138	158		Injection begun.
16 30		130	158		Injection ended.
18 30		138	162		
21 00		136	178		
24 00		134	170		
29 00		130	168		
32 00		130	150		
35 45		132	144		
40 30		128	146		

EXPERIMENT No. XVIII.

[Dog; weight, 12 kilos; vagi cut; tube in trachea. Pure alcohol used.]

0 00		188	192	12	
15 00	2	186	192	10	Injection begun.
15 30		192	194	10	Injection ended.
16 45		194	198		Struggles.
18 00		200	196	8	Respiration weak.
22 00		196	192	8	
25 00		192	192	6	
28 30	2	192	180	6	Injection begun.
29 00		180	186		Injection ended.
32 00		176	178	6	Respiration very shallow; eye reflexes weak.
36 30		168	178	6	
44 00		172	182	6	
50 00		168	182	6	
58 00		162	182	6	Killed with chloroform.

EXPERIMENT No. XIX.

[Dog; weight, 8 kilos; vagi cut; tube in trachea. Alcohol 25 per cent used. Continuous injection employed.]

0 00	216	182	8	
10 00	216	182	8	Injection started.
11 20	218	184	8	
13 00	210	180	10	Struggles.
16 00	200	176	8	Has had 50 c.c.
18 00	190	176	6	
23 30	182	168	6	Pulse-waves large.
29 00	168	138	4	Has received 120 c.c.
32 00				Clot for 5 minutes.
38 00	152	140	4	Started injection again.
39 45	140	128		Muscular rigidity; eye reflexes gone.
48 00	66	132	4	Has had 150 c.c. Stopped injection.
53 00	52		4	
55 00	40	118		Stopped breathing.
58 00	40			
59 00				Heart ceased in diastole.

EXPERIMENT No. XX.

[Dog; weight, 13.5 kilos; cord and vagi cut; cut cord between third and fourth cervical vertebræ; artificial respiration. Pure alcohol used.]

Time.		Dose.	Pressure.	Pulse per minute.	Respirations per minute.	Remarks.
m.	*s.*	*cc.*	*mm.*			
0	00	.....	88	178	.....	
5	30	2	86	178	.....	Injection begun.
6	00	.....	88	182	.....	Injection ended.
7	45	.....	92	188	.....	
9	30	.....	102	186	.....	
12	45	.....	98	180	.....	
15	00	2	98	180	.....	Injection begun.
15	30	.....	96	170	.....	Injection ended.
18	00	.....	82	158	.....	Pulse waves large.
22	00	.....	90	160	.....	
25	00	2	78	148	.....	Injection begun.
25	30	.....	74	140	.....	Injection ended.
28	00	.....	48	98	.....	
32	30	.....	40	90	.....	
35	00	.....	42	98	.....	
39	45	.....	30	82	.....	Killed with ether.

EXPERIMENT NO. XXI.

[Dog; weight, 22 kilos; vagi and cord severed; cord cut between fourth and fifth cervical vertebrae; artificial respiration. Alcohol 25 per cent employed. Continued injection.]

0	00	.....	102	206	.....	Injection begun.
4	30	.....	102	204	.....	
6	45	.....	112	224	.....	
8	00	.....	114	260	.....	Has had 30 c.c.
12	30	.....	98	198	.....	
16	00	.....	68	206	.....	
28	00	.....	52	206	.....	
30	00	.....	52	.....	.....	Pulse irregular; has received 250 c.c. Stopped alcohol.
40	00	.....	40	172	.....	Pulse-waves large.
46	00	.....	30	98	.....	
48	00	.....	30	98	.....	
50	00	.....	28	80	.....	
52	00	.....	.....	.....	.....	Animal died.

A careful examination of all these experiments shows that there are no marked changes in the pulse-rate in connection with the variations of the blood-pressure, except those due to a direct cardiac action. Again, granted that the blood-vessels themselves are dilated, as asserted by Miessner[1] and suggested by Mohilansky[2] there is, indeed, no positive proof or evidence that the central vasomotor nervous system is influenced by alcohol. Moreover, the results obtained in the experiments performed on the isolated hearts of frogs, point to one and the same conclusion.

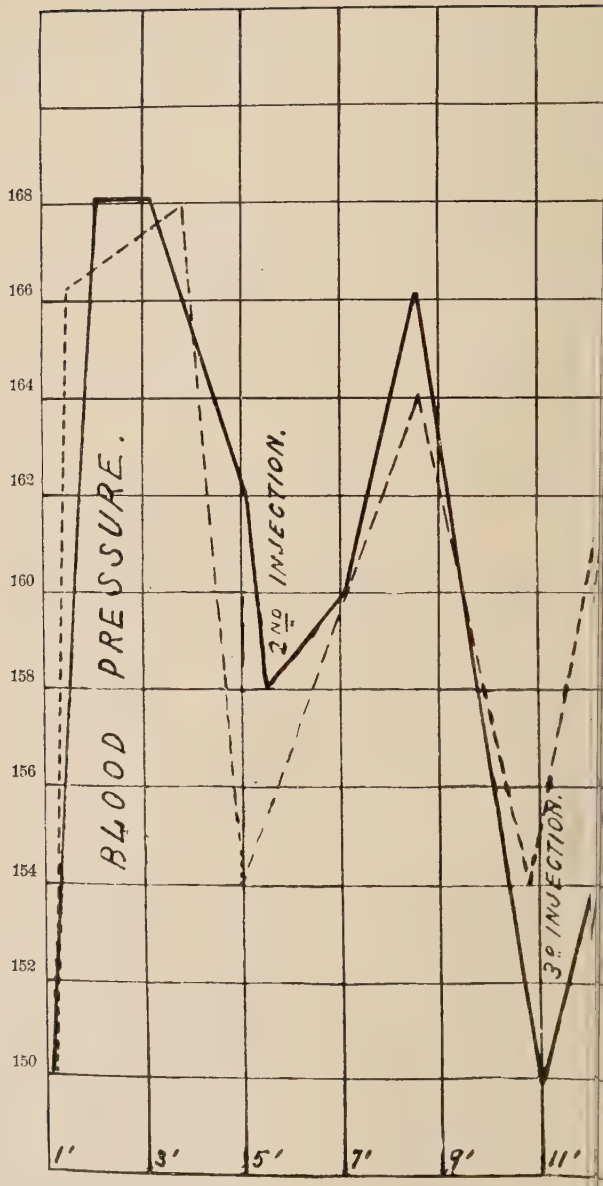
Alcohol, then, in small amounts, causes an increase in the pulserate, not by influencing the cardio-inhibitory apparatus or the vaso-motor system, but mainly by a direct action of the drug upon the heart. These results confirm those obtained especially by Castillo and Eagleton.

Large quantities of alcohol, on the other hand, exercise from the first a depressant effect on the rate of the pulse, this phenomenon continuing till the occurrence of death; and it is safe to infer that such an effect is similarly the result of a direct cardiac action. (See Experiment XV*a*.)

On the Blood-pressure.—Following the injection of a small quantity of alcohol, in the normal animal, as is observed in the preceding experiments, there occurs within a short time a sufficiently marked rise of the column of mercury in the manometer.

[1] *Loc. cit.*

[2] Medical Chronicle, November, 1889.



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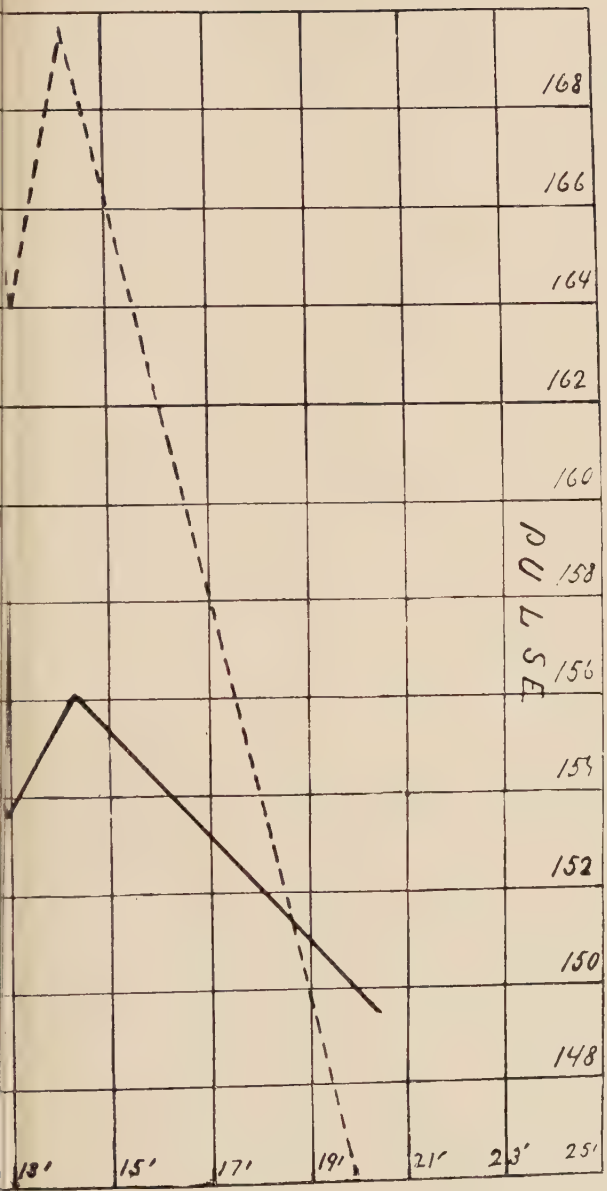
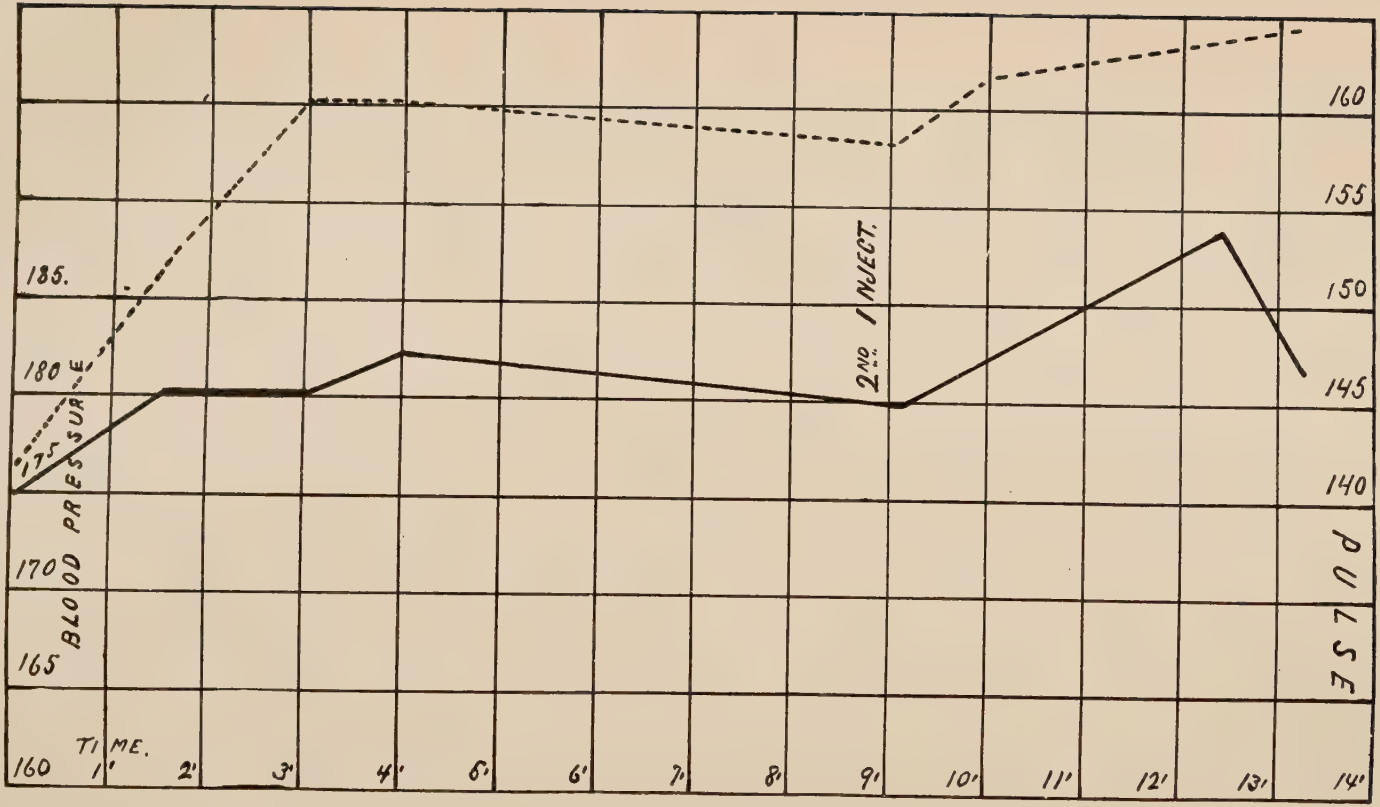


XPERIMENT X.

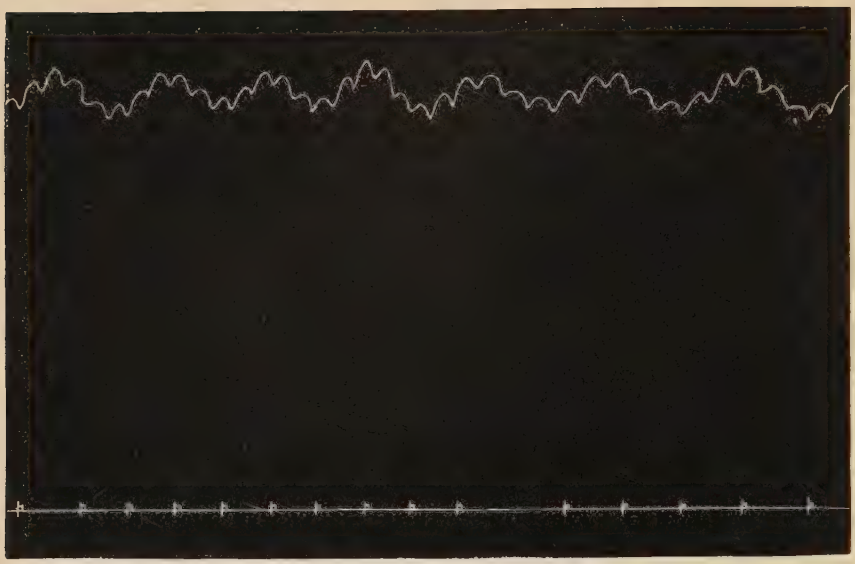
Blood pressure.
Pulse.



ALCOHOL—EXPERIMENT XI.

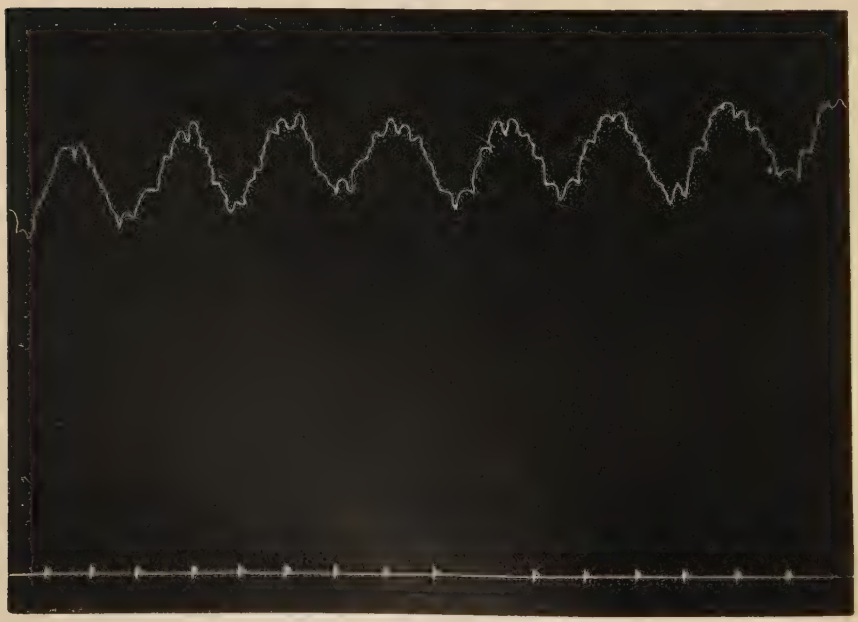
Black line = Pressure.
Dotted line = Pulse.

TRACING A.



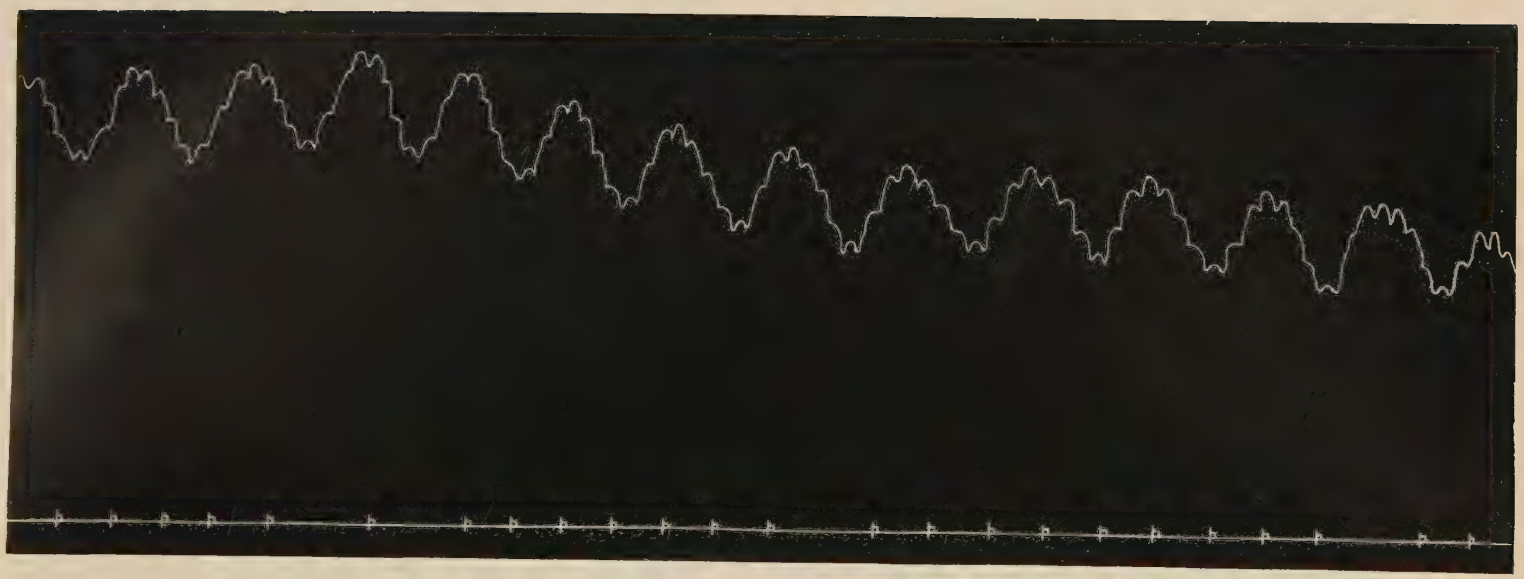
ALCOHOL.—Tracing of a dog weighing 4 kilos. Injected 1 cc. of the pure drug.

TRACING A.—Continued.



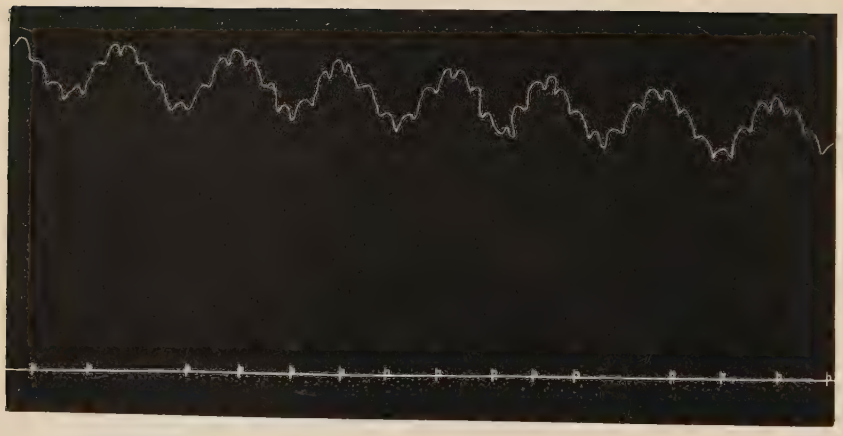
The same, ten minutes afterwards.

TRACING A.—Concluded.



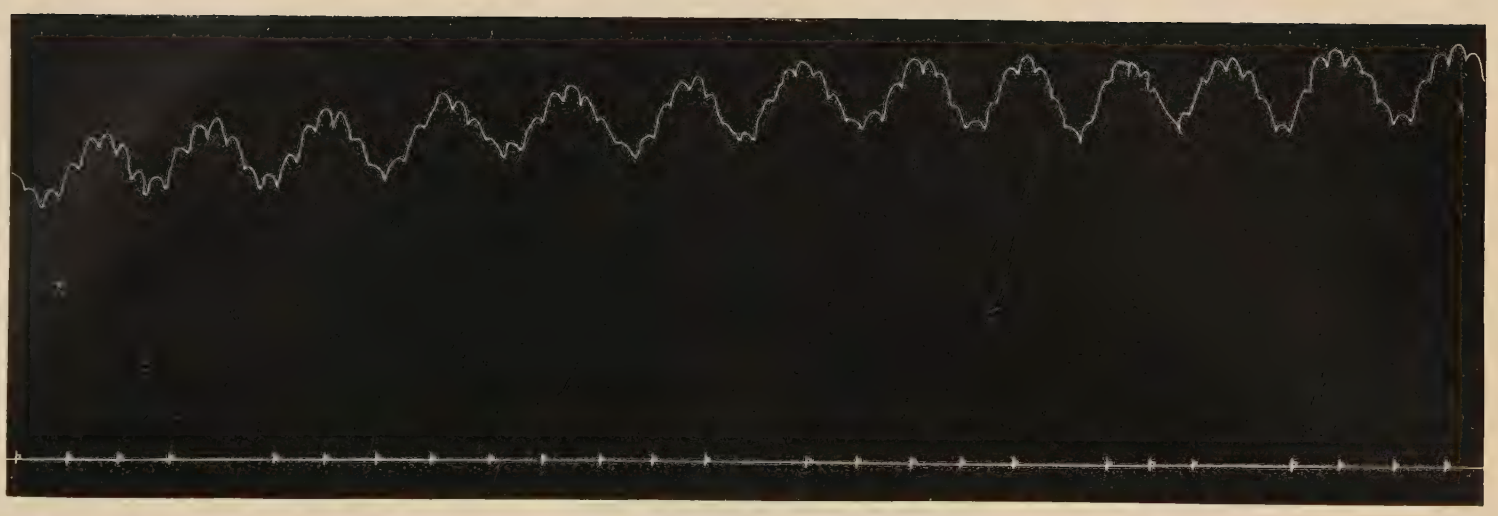
The same, fifteen minutes afterwards. Gave then 2 cc. more of pure alcohol, the injection being followed immediately by a decrease of the blood pressure; this decrease, however, was soon recovered from.

TRACING A 2.



ALCOHOL.—Tracing of a young dog that had bled quite freely. Injected 1 cc. of drug.

TRACING A 2.—Concluded.



The same, two and a half minutes afterwards.

After a while the pressure returns to its normal height, and again rises if a second dose is given, to be once more decreased below the normal if the amount of the drug injested is carried beyond a certain limit. Thus in Experiment X, after the administration of 10 c. c. of a 25 per cent solution, a rise of 18 mm. occurred one minute and forty-five seconds afterwards, and in two and a half minutes more the pressure fell to 158 mm. (the normal being 154 mm). A second injection of 15 c. c. was followed by an increase of 16 mm. above the normal point within half a minute. A third injection of 20 c. c. caused a very slight rise, this lasting for about eight minutes, and then there was a gradual fall below the normal. The same results are noticed in Experiments XI and XII.

In experiment XIII a continuous injection was employed of a solution of the strength of 20 per cent. Three minutes after the injection had been started, the pressure rose to 138 mm. (the normal being 132 mm.), and to 142 mm. three minutes later. By the time that the animal had received 50 c. c. of the alcoholic solution (eight minutes after the beginning of the injection), the pressure marked 138 mm., still above the normal, but it soon afterwards began to diminish and was seen at 128 mm. by the time that 155 c. c. of the solution had been ingested into the animal. The pressure, with slight variations, and accompanied with disturbances of the reflexes and the respiration then fell gradually till the occurrence of death, this latter issue taking place through failure of the respiration.

Similar results were obtained in Experiment XIV. In this animal the normal pressure was 138 mm. There was a slight rise a few minutes after the commencement of the injection. By the time the dog had received about 260 c. c. the column of mercury marked 118 mm. The crural nerve which had been previously prepared, was then stimulated with an electrical current of medium strength, and a few seconds afterwards the pressure rose to 122 mm., showing evidently that the vasomotor system was intact. When 325 c. c. of the alcoholic solution had been ingested the pressure marked 98 mm. only. At this time the sciatic nerve, which had also been previously prepared, was irritated with a strong faradic current, and the column of mercury in the manometer was seen to rise to 106 mm. Ultimately the animal died from respiratory failure, having lived forty-six minutes under the influence of alcohol.

Experiment XV shows the same effects on arterial pressure. After 6 c. c. of pure alcohol had been administered, the column of mercury was reduced to 120 mm. (from 150 mm. to which it had been elevated, that is, 12 mm. above the normal). At this time artificial asphyxia was produced by tying the trachea tightly. Here again, under such circumstances, there was a decided response by the vasomotor system, as shown in the rise of pressure to 142 millimeters.

The effects of small doses of alcohol may also be seen in tracing A and in the accompanying plot.

I found likewise that in curarized animals, in which any influence exercised by the respiration on blood-pressure, is thus avoided, alcohol in small amounts, produces the same results, as may be observed in Experiments XVI and XVII.

Large doses of the drug cause from the onset a decided lowering of the arterial pressure, this decreasing steadily, if the amount of alcohol has been sufficiently poisonous, till the occurrence of death. (See Experiment XV*a*.) If the dose is moderately large its ingestion into the torrent of the circulation is followed by a decided fall, the result, no doubt, of an overwhelming action of the drug upon the heart. In these instances the pressure is apt to recover, but does not go beyond the normal height.

Let me study how these changes of blood-pressure under the influence of alcohol are brought about.

It has been shown by the most recent physiological researches that, when in an animal under the influence of a drug, the two curves (as registered on the revolving kymograph), one representing the rate of the pulse and the other the height of the

blood pressure, run parallel, such an effect is the result of an action upon the heart; but if opposite to each other, the phenomenon is dependent upon a vasomotor influence. In other words, if the arterioles are made to contract, through a vasomotor stimulation or spasm, the blood pressure rises, but, at the same time, the increased blood pressure stimulates the cardio-inhibitory centers in the medulla oblongata. As a consequence of this latter phenomenon the rate of the pulse falls, and thus the curves of the pressure and the pulse run in opposite directions. When this takes place it is assumed that the change in the arterial pressure is due to vasomotor influence exercised on the arterioles.

Now, then, a plot taken from a kymographian record of an animal under the influence of alcohol in moderate amounts would, undoubtedly, show a parallel course of the curves, this alone giving evidence of a cardiac action. There is, however, further and perhaps more conclusive evidence of this action of the drug under consideration.

Faradization of a sensitive nerve and asphyxia, as observed in Experiments XIV and XV, are able to elevate the arterial pressure depressed by toxic quantities of alcohol, this result proving that the vasomotor system is intact. But the stimulation by small doses of the drug might as well be ascribed to an influence exercised on the vasomotor system, or to a paralysis of the cardio-inhibitory apparatus, as to a direct cardiac action. Yet, that such is not the case is shown by the results obtained in the third and fourth series of the experiments performed on dogs. In these experiments the cardio-inhibitory and the vasomotor influences were eliminated by previous section of both pneumogastric nerves in the first place and by previous division of both vagi and the spinal cord in the second instance. Post-mortem examination of these latter animals showed that the cord had been completely severed.

The results obtained in Experiments XVIII and XIX, and in XX and XXI are obvious. An examination of the corresponding tables, of tracing B and C and the accompanying plots, shows that alcohol, under such circumstances, is still able, when given in small quantities, to stimulate the arterial pressure and the pulse-rate. Large doses of the drug, in all cases, produce from the onset effects of depression.

It must be concluded, then, from the foregoing experimental evidence, that alcohol in small amounts causes a rise of the arterial pressure by a direct action upon the heart; and that in large or toxic quantities it lowers the blood-pressure similarly through a cardiac influence. The question of the dilatation of the blood-vessels, as pointed out by Miessner and Mohilansky, must remain, for the present, *sub judice.*

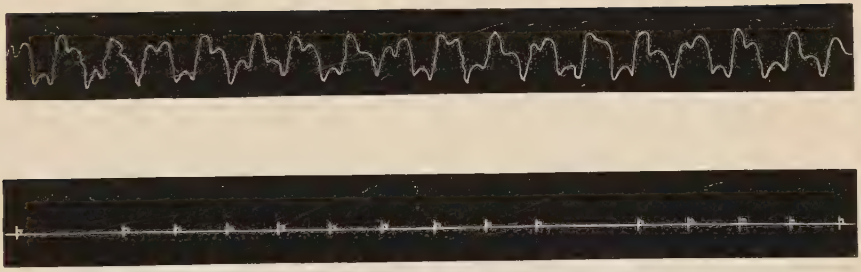
On the Blood.—If alcohol is mixed with blood outside of the body coagulation is enhanced. I have often observed this in my experiments, not only in those made solely to study this phenomenon but also in those already sufficiently described. I found that coagulation of the blood could be largely prevented by diluting the alcohol before its ingestion into the torrent of the circulation. To what these effects were due was not determined. Microscopical examination of the blood of animals killed with alcohol, showed marked alterations of the corpuscles, many of these appearing shriveled and exhibiting a yellowish matter in their interior. This latter observation has been previously made by Schultz[1] and by Jaillet and Hayem.[2] Schmiedeberg[3] has noticed that alcohol mixed with blood diminishes the ability of this fluid to yield oxygen in the presence of a reducing agent. There is no doubt that alcohol in this action causes the separation of the hæmoglobin from the corpuscles.

ON THE RESPIRATION.

Small doses of alcohol do not markedly affect the rate of the respiratory movements, although sometimes the breathing is slightly increased. In large or toxic amounts the drug generally decreases the respiratory rate, accompanied by a diminution of the depth of the movements. As a rule the amount of air going through

[1] Hufeland's Journ., April, 1841.
[2] Virchow and Hirsch, Jahrbucher, 1884.
[3] Virchow's Archives, Vol. II, p. 171.

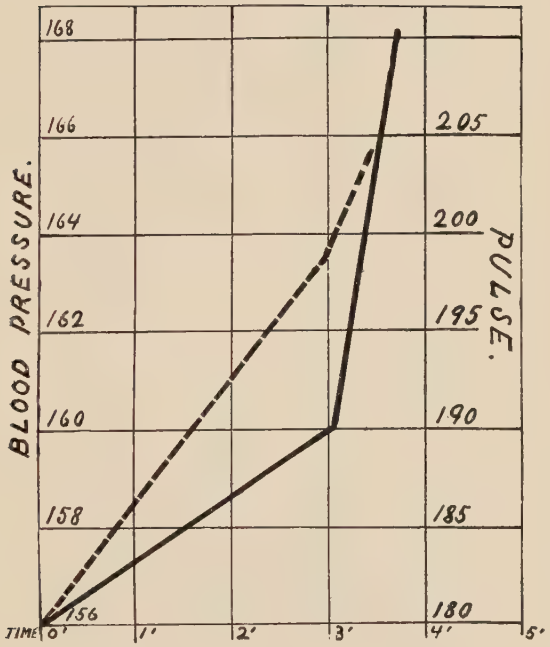
TRACING B.



ALCOHOL.—Tracing of a dog with both vagi cut. Injected 1 cc. of drug

TRACING B.—Concluded.

The same, three minutes afterwards.



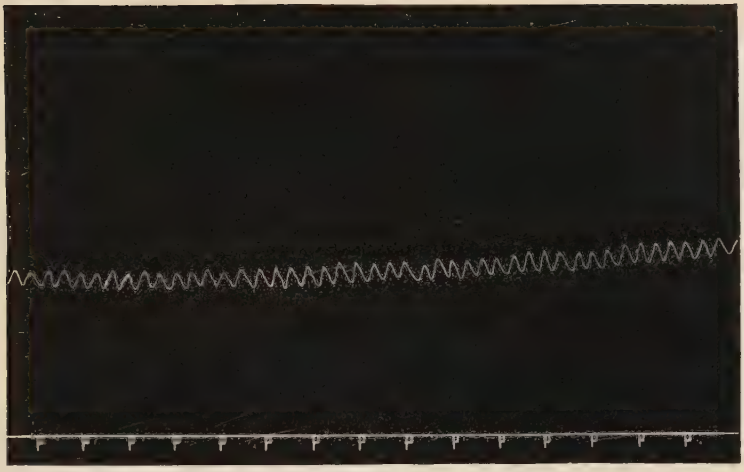
PLOT OF TRACING B. (VAGI CUT.)

Black line = Pressure.
Broken line = Pulse.

TRACING C.

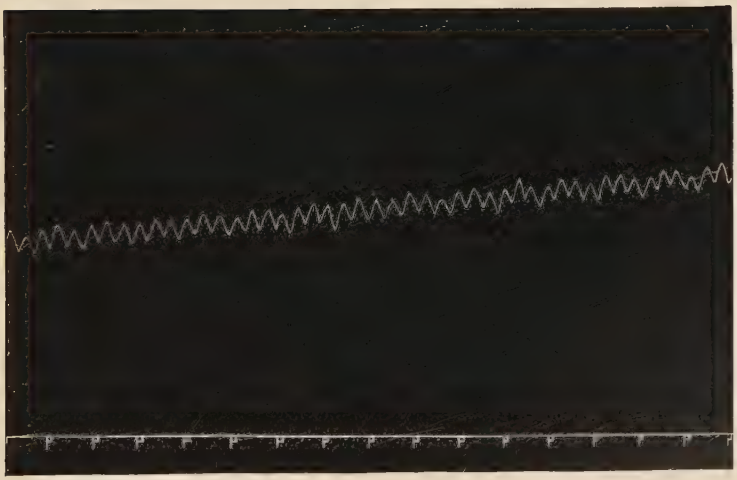
ALCOHOL.—Tracing of a dog with both vagi and spinal cord cut. Injected 2 cc. of drug.

TRACING C.—Continued.



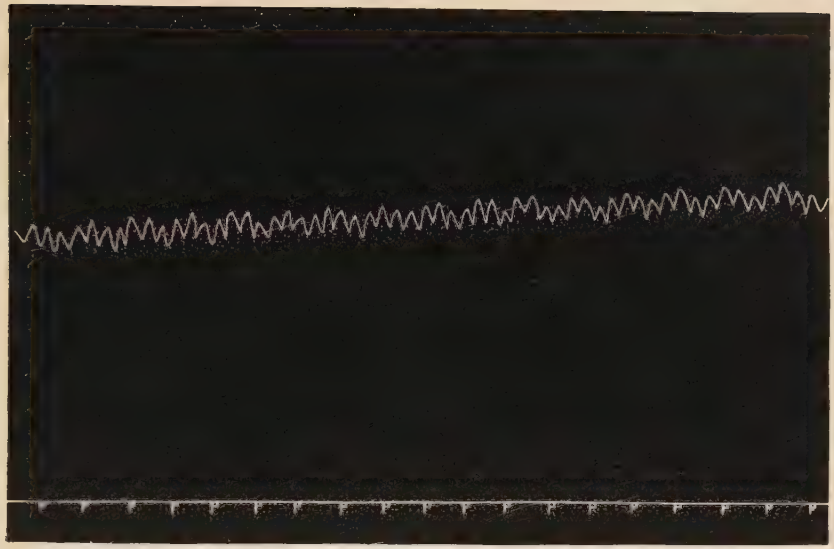
The same, two minutes afterwards.

TRACING C.—Continued.

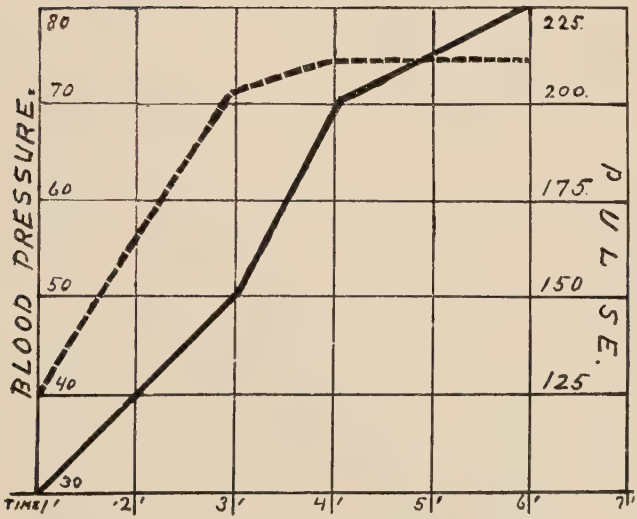


The same, five minutes afterwards.

TRACING C.—Concluded.



The same, twelve minutes afterwards.



PLOT OF TRACING C. (VAGI AND CORD CUT.)

Black line = Pressure.
Broken line = Pulse

the lungs, whether the rate is increased (in which case the respirations are usually shallow), or whether the depth of the movements is diminished, the amount of air passing in and out of the lungs is decreased. The results of the experiments recorded already in regard to the respiratory rate are sufficiently clear. As the same effects are noticed in animals in which the vagi have been previously divided, it is evident that alcohol diminishes the respiratory movements by a direct action on the centers in the medulla.

Regarding the actions upon the function of respiration there is little or no positive evidence and, therefore, what is really meant by respiratory stimulation or depression, under the influence of drugs, has not been definitely established. Authorities are at variance upon this question of vital importance. Thus, for instance, it is generally held that opium and belladonna are physiological antagonists so far as their action on the respiration is concerned; and, indeed, it has been taught for a long time that in human opium poisoning belladonna, or its alkaloid atropine, is the antidote *par excellence*. This teaching has been followed by the routine practice of administering this latter substance in all cases of poisoning by the former, with results enveloped in contradictory and extremely unreliable evidence.

From the results obtained in a special investigation upon the subject I am inclined to the belief that atropine is not a respiratory stimulant in the true sense of the term. For the sake of illustration, permit me to devote a few words to the matter.

It has been stated by the writer[1] that "Without sufficient proof atropine has been looked upon as essentially a respiratory stimulant. But the truth of the matter is that here again we find the action of the drug to be uncertain, especially in normal animals. In those animals in which the vagi have been previously divided, the drug, it is true, almost always causes an increase in the respiratory rate, and while this shows that the agent acts directly on the centers in the medulla oblongata, it does not prove that the drug is a respiratory stimulant. If this were so we would have the same more or less constant effects in the normal animals, as is the case with cocaine, ammonia, caffeine, and strychnine, perhaps, and other drugs (and they are not many) which may be classed as true respiratory stimulants."

The writer then refers to the observations embodied in a paper by Reichert:[2] "In seven experiments performed on dogs, it was found that in five an increase in the number of respirations was effected sometime during the observation, while in two it was practically unaffected. The increase took place sometimes immediately on the injection of the drug, at others not until several minutes after, while still in others there was, instead of an increase, either no effect at all or a tendency to a gradual decline. I have observed similar phenomena, and not until repeated experiments gave me almost invariably the same results did I not make up my mind to discard atropine from the class of respiratory stimulants in the proper sense of the term. Thus, in conformity with such evidence it must be concluded that, as Reichert tersely put it, "atropine acts upon the respiratory function at the same time in two opposing ways: One (peripheral) tending to diminish, and the other (central) tending to increase, the increase or decrease of the respirations in the normal animal depending upon which one of these factors predominates."

In regard to the same subject about the effects of atropine in human opium poisoning, Wood,[3] taking issue with Reichert, says that this latter author contradicts himself when he (Reichert) affirms that "thus clinical, experimental, and toxicological data demonstrate clearly that atropine can not be considered a reliable respiratory stimulant," and on the opposite page the same author states that "the fact that the rate of the respiration is always increased after section of the pneumogastric nerves is conclusive proof that the drug stimulates the respiratory centers."

[1] Daniel's Texas Medical Journal, December, 1892.
[2] University Medical Magazine, February, 1891.
[3] University Medical Magazine, March, 1891.

But in reply, Reichert[1] contends that there is no contradiction in his previous statements; that a distinction must be made between *action* and *effect;* that a drug may stimulate the respiratory centers, and yet not be a respiratory stimulant. Atropine, it is true, stimulates the respiratory centers, and yet an increase in the rate and depth of the respiratory movements may be wanting. The writer makes a comparison in the case of a drug which may powerfully stimulate the motor centers of the cord, and yet not be a convulsant. He further contends that the effects are inconsistent, and may be in opposite directions.

Now, then, while the question of what constitutes respiratory stimulation or depression, whether, on the one hand, the phenomenon of stimulation is the result of an increased rate or increased depth of the respiratory movements, and whether, on the other hand, the depression should be ascribed to decreased rate or depth of such movements; while the question, I repeat, of what constitutes respiratory stimulation or depression remains *sub judice,* in the case of alcohol both the rate and the depth of the respirations are decreased as a general rule. Considering the matter from either point of view I believe myself justified in stating that the drug under study is a respiratory depressant.

Indeed, a drug may enormously increase respiratory rate, and yet the amount of air inspired, owing to the shallow character of the respiratory movements, be actually decreased below the normal standard. On the contrary, a substance may diminish the rate of the respiration, but at the same time the depth of the movements may be so increased as to let into the lungs a larger quantity of air than normally. This being so, in the one case an observer might consider a drug a respiratory stimulant judging from the increased rate produced; and yet the amount of oxygen inhaled would be so diminished as to be insufficient to effect the normal stimulation owing to the shallow character of the respiratory depth. And *vice versa,* the same or another investigator might state that a second remedy is a respiratory depressant judging from the slow rate caused by it, when the depth of the respiration is so augmented as to effect the introduction into the lungs of a larger amount of oxygen than normally, in which case the drug is, in fact, producing stimulation.

Returning to our study of alcohol, I have found that this substance not only produces, in sufficient amounts, a decreased rate but also a diminution in the depth of the respiratory movements, this giving rise to a lower quantity of air passing in and out of the lungs than in normal conditions.

I have in this respect conducted a special series of experiments, the results of which are recorded below.

A simple apparatus was constructed consisting of two bottles filled with mercury, in which this substance served the purpose of a valve against tubes inserted through a tight rubber stopper. Both bottles by means of rubber tubing and a Y-shaped glass-tube were connected with the trachea of the animal experimented upon; and in turn, one of the bottles was left in contact with the external atmosphere, the other with large rubber bags, these again being made to communicate with a common air meter. Thus, the air inspired by the animal was wholly transferred to the rubber bags, and the amount of air passing through the lungs in a certain period of time was more or less accurately ascertained by the meter. I first measured the air for two or three periods, of five minutes' duration each, before injecting the drug, and then proceeded to repeat the operation while the animal was under the influence of alcohol. The following normal experiments are described:

[1] University Medical Magazine, April, 1891.

Experiment XXII.

[Dog; weight, 7·71 kilograms.]

Period.	Respiration per minute.	Meter air movement.	Remarks.
First	48	7·9	Dog quiet.
Second	46	7·6	Do.
Third	46	7·6	Dog quiet; injected 1 c. c. of pure alcohol.
Fourth	36	5·4	
Fifth	30	4·9	Dog quiet; injected 2 c. c. of pure alcohol.
Sixth	24	4·8	Respiration shallow.
Seventh	24	4·1	Eye reflexes very weak.
Eighth	24	4·1	Injected 2 c. c. of pure alcohol.
Ninth	22	3·8	Eye reflexes gone; animal alcoholized.
Tenth	18	3·1	Eventually killed with ether.

Experiment XXIII.

[Dog; weight, 12·6 kilograms.]

First	72	19·6	
Second	72	19·4	
Third	78	20	Animal struggles. Injected 2 c. c. of pure alcohol.
Fourth	60	15·1	
Fifth	54	13	Injected 3 c. c. of pure alcohol.
Sixth	36	9·4	Eye reflexes gone. Injected 5 c. c. of pure alcohol.
Seventh	30	7·3	Respirations irregular and shallow.
Eighth	12	5·7	Muscular rigidity.
Ninth	8	4·6	
Tenth	6	3·8	Respirations very shallow. Killed with ether.

Experiment XXIV.

[Dog; weight, 18·1 kilograms.]

First	22	14	
Second	28	15·5	Animal struggles.
Third	20	13·8	Dog quiet, injected 3 c. c. of pure alcohol.
Fourth	18	12	Dog whines and is restless.
Fifth	12	11·8	Injected 5 c. c. of pure alcohol.
Sixth	10	11	Eye reflexes very weak.
Seventh	10	11·1	
Eighth	8	10·2	Injected 10 c. c. of pure alcohol.
Ninth	6	7·2	Eye reflexes gone; respiration shallow.
Tenth	4	4·2	
Eleventh			Animal died.

Experiment XXV.

[Dog; weight, 9.8 kilos. Alcohol, 25 per cent solution used.]

First	24	7.1	
Second	26	7.3	
Third	22	7.1	Started injection.
Fourth	28	6.8.	
Fifth	40	6.2	Respirations very shallow.
Sixth	32	5.3	Respirations very shallow; eye reflexes almost gone; has received 215 c. c.; stopped alcohol.
Seventh	12	4	
Eighth	14	3.8	
Ninth	8	2.5	Animal died suddenly.

The same results were obtained in animals in which the vagi had been previously severed. In this connection I have made the observation that after section of the pneumogastric nerves, although the respiratory movements, as is well known, are generally diminished in rate, there is quite often an increase in their depth, and as a consequence a larger amount of air than in normal conditions is taken in by the animal. On the other hand, I have frequently noticed that after division of the vagi,

instead of a decrease there often occurs an enormous increase in respiratory rate (a phenomenon I am unable to explain at present), but at the same time the shallow character of the movements admits of a proportionate diminished quantity of air entering the lungs.

Alcohol, after previous division of the pneumogastrics, is still able to produce a diminution in the depth of the respirations, this diminished depth causing a lessening in the amount of air inspired. This is shown in the experiments recorded below.

EXPERIMENT XXVI.

[Dog; weight, 16.7 kilos.]

Period.	Respiration per minute.	Meter air movement.	Remarks.
First	18	8	
Second	16	8.1	
Third	16	8	Cut both pneumogastric nerves; tube in trachea.
Fourth	8	12.3	Ten minutes after vagi cut.
Fifth	8	12.6	Animal struggles.
Sixth	6	12.1	Dog quiet again—injected 2 c. c. of pure alcohol.
Seventh	8	11.6	
Eighth	8	11.8	
Ninth	6	11.1	Injected 5 c. c. of pure alcohol.
Tenth	6	10.2	Respirations shallower.
Eleventh	4	8.1	Eye reflexes gone; respirations exceedingly shallow.
Twelfth	----------	----------	Dog died suddenly.

EXPERIMENT XXVII.

[Dog; weight, 16.8 kilos. Alcohol, 25 per cent solution used.]

First	26	9.3	
Second	24	9.5	
Third	24	10	Cut both vagi; tube in trachea.
Fourth	12	11.	Period taken ten minutes after cutting of vagi.
Fifth	16	12.	
Sixth	12	15.2	Respirations deep.
Seventh	12	16.1	Started injection.
Eighth	10	12 8	
Ninth	8	10.1	Eye reflexes weak; has received 125 c. c.
Tenth	8	7 2	
Eleventh	6	5.1	Has had 200 c. c.
Twelfth	6	3.7	Has had 240 c. c.; stopped alcohol.
Thirteenth	6	2.1	Respirations quite shallow.
Fourteenth	----------	----------	Animal died.

As in the case of respiratory rate, alcohol, therefore, causes a depressant effect on the depth of the respirations and the amount of air passing through the lungs, such a result being due also to a direct action of the drug on the respiratory centers in the medulla oblongata.

In concluding this portion of the subject, in which, by the methods sufficiently described, I have been able to study at the same time the behavior of alcohol on the circulation and the respiration, I may state that I did not attempt to ascertain accurately the minimum fatal dose of the drug in dogs. In fact, the action of alcohol upon the lower animals, even of the same species, varies as regards its toxicity, and any general conclusions drawn from one series of experiments may be diametrically opposed to those arrived at in a second series of experiments. However, taking in consideration the most striking of my experiments, I obtained the following records: In Experiment XII 17 c. c. of pure alcohol proved fatal to a dog weighing 9.9 kilos, in which case 1.7 c. c. of the drug per kilo of the body weight may be said to have been the lethal dose. In Experiment XIII a dog weighing 8.3 kilos died after an injection of 320 c. c. of a 20 per cent solution of alcohol, giving as an average for the fatal amount 38.5 c. c. of the solution per kilo of the body weight. In Experiment

XIV, in which a 25 per cent solution was employed, 325 c. c. of this was sufficient to destroy a dog weighing 8.9 kilos, the average being quite similar to that noticed in the second example here referred to, that is, 36.5 c. c. per kilo of the body weight. Eagleton observed that alcohol in the strength of 25 per cent produced in the proportion of from 5 to 40 c. c. per kilo of the animal's weight, results apparently similar to mine.

ON BODILY METABOLISM.

On the elimination of carbon dioxide and the absorption of oxygen.—The absorption of oxygen and the elimination of carbon dioxide have been the subject of very elaborate researches, and although there appears to be some difference of opinion in the two questions at issue, most investigators seem to have arrived at almost definite conclusions. Let me, however, bring to the notice of the reader the most important points in the controversy, which will serve as the basis for this study and for further research. The subject presents a wide field for further investigation.

In regard to the elimination of carbon dioxide Boecker,[1] Perrin,[2] Davis,[3] Hammond,[4] Boeck and Bauer,[5] and Rumpf[6] affirm that under the influence of alcohol there is a distinct decrease in the amount of carbon dioxide exhaled; and although whisky, brandy, and gin diminished the production of the gas, according to the researches of Smith,[7] quoted by Wood,[8] yet Smith states that alcohol in small quantities increases the elimination of the carbon dioxide. This same increase has been observed by Wolfers[9] in the case of the rabbit.

Closely allied to this question of elimination of carbon dioxide is that of the absorption of oxygen, similarly of the greatest interest. This has also been the subject of recent investigations. Thus, Henrique,[10] from experiments performed upon himself, found that there was an increase in the amount of oxygen consumed. Identical results were obtained by Wolfers[10] in the rabbit, and in rabbits and dogs by Bodlander.[11]

Zuntz,[12] who experimented upon man, came to opposite conclusions, asserting that the consumption of the oxygen is decreased. Forster[13] made similar observations. "No important effect," on the other hand, was noted by Geppert[14] in a similar series of experiments. The matter has been discussed at length by Warren;[15] and Wood,[8] commenting upon the contradictory nature of the evidence presented up to 1891, states that to his mind such evidence "is probably in part due to the experimental difficulties of the subject, but at the same time strongly indicates that moderate doses of alcoholic spirits have no constant very decided action upon the formation and elimination of carbonic acid. It is readily conceivable that by checking or aiding digestion, by influencing circulation, or in some other way they may exert a varying indirect action, which is superior to the slight direct influence in lessening carbonic acid production, which the weight of evidence indicates that they possess."

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[1] Quoted by Bernard in Journ. de Pharm. t. xv., third series, 1849.
[2] Archiv. General., t. iv., sixth series.
[3] Trans. of the Americ. Medic. Associat., 1855.
[4] Physiological Memoires, Philadelphia, 1863.
[5] Zeitschr. f. Biolog., x, 1874.
[6] Pflug. Archiv., xxxiii, 1884.
[7] British Medical Journal, 1859.
[8] Therapeutics: Its Principles and Practice, 1891.
[9] Pflug. Archiv., xxxii, 1883.
[10] Bul. de l'Academie Royale de Belge, ii, 1883.
[11] Zeitschr. f. Klin. Med., xi, 1886.
[12] Fortschr. der Med. i, 1887.
[13] Annual of the Universal Medical Sciences, 1883.
[14] Archiv. f. Exp. Pathol. und Pharm. xxii.
[15] Boston Med. and Surg. Journal, July, 1887.

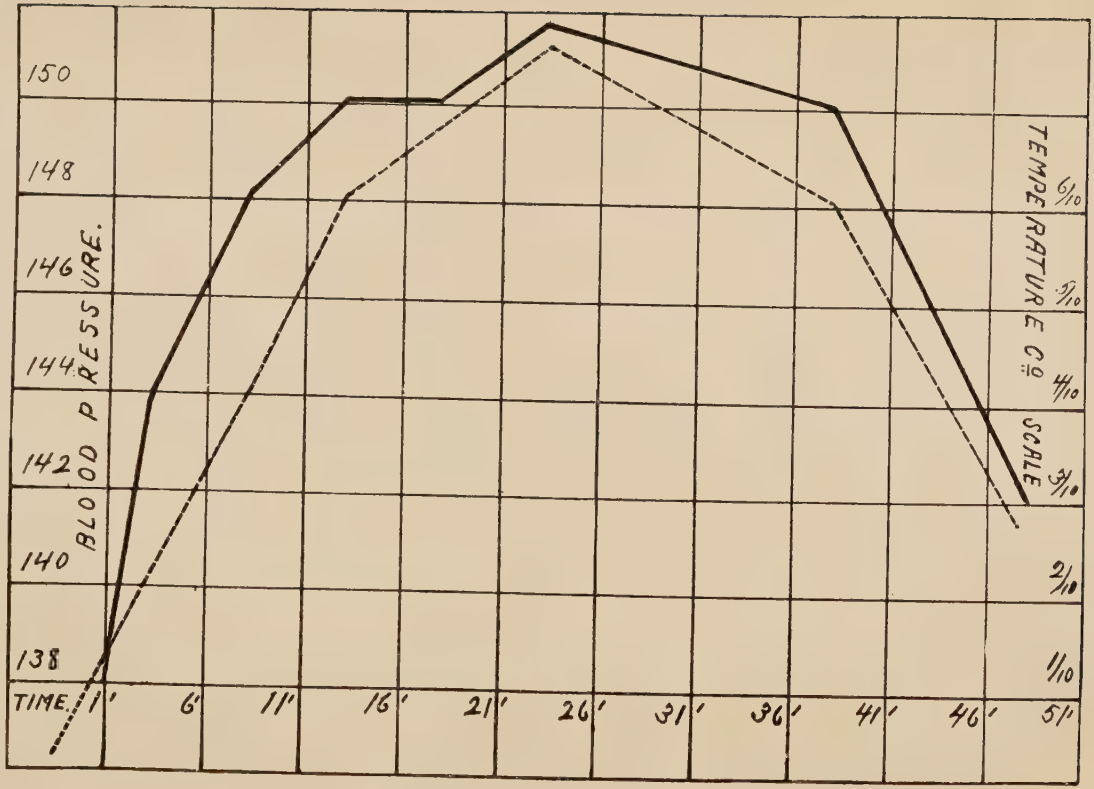
On nitrogenous excretion.—Upon the elimination of nitrogenous material alcohol has, although denied by some observers, a very decided action. Boecker[1] has apparently proven experimentally that the drug decreases the elimination of urea. This is opposed by Parkes and Wollowicz;[1] and yet it is seen in the experiments of these latter investigators that, with the exception of one day in which the man experimented upon had a chill followed by a feverish reaction, the daily excretion of urea was 34.35 grams during the alcohol period; during the time when brandy was taken the elimination of urea was 34.8 grams, while during the water period it was 35.02 grams. There was, therefore, a reduction in the excretion of urea by about 10 grains (0.65 gram) daily.

Hammond, quoted by Wood,[1] experimented upon himself, dividing his experiments into three series: First, when just sufficient food was taken to maintain the weight of the body; secondly, when more food than enough was taken for that purpose; and thirdly, when not enough food was ingested. The results noticed were in all instances similar, that is, they showed that alcohol lessened the amount of chlorides, phosphates, and urea. These results have been confirmed by the careful experiments of Rieso,[2] made on two persons placed under the strictest conditions. This author found that, under the influence of alcohol, there was a marked decrease in the urea elimination, and to a less degree also in the excretion of chlorides, phosphates, sulphates, and uric acid. There was at the same time a gain of the bodily weight.

This action of alcohol on metabolic changes is further corroborated by the excellent researches of Mohilansky,[2] house physician to the Clinic of Manassein. The investigator undertook a series of experiments on fifteen individuals, most of them healthy medical students aged from 18 to 28 years. His object was to study the action of alcohol not only on the nitrogenous metabolism, but also on the assimilation of proteids and fats. Some of the subjects experimented upon were total abstainers, some were occasional drinkers, while others were habitual alcohol drinkers. The ingestion of the drug varied according to the habit of the individual, and the daily dose administered varied from 60 to 140 cubic centimeters (2 to 5 ounces of absolute alcohol, or from four small wine glassfuls (*rumka*) to half a bottle of a 40 or 42 per cent vodka (aquavit). In other words, a sufficient amount was given to produce a slight intoxication, such as high spirits, talkativeness, etc.

The results of Mohilansky's study are so important that I will transcribe the principal ones. He found: (1) In people habituated to alcohol, when taken in moderate quantities, it distinctly improves the appetite, and gives rise to a marked increase in the assimilation of the nitrogenous constituents of food, the average surplus amounting to 2.09 per cent, the maximal to 4.22. (Thus a patient who had been assimilating 93.10 per cent nitrogen, without alcohol, when this drug was added to his dietary, proved to be assimilating 96.07 per cent of nitrogen.) (2) In habitual total abstainers, however, the assimilation is somewhat diminished, that is, from 0.28 to 0.33 per cent. (3) The increased assimilation in the former category must be attributed to a more complete absorption and intensified gastric digestion, which result from a prolonged retention of food in the stomach on the one hand, and from increased digestive power and secretion of the gastric juice (Bernard, Kretschy, Richet, Lever, Petit and Semerie, and Gluzinski) on the other. (4) The nitrogenous metabolism or disintegration of proteids almost invariably decreases (this happened in 13 out of the 15 cases observed), the average fall being 8.73 per cent, the maximal 19.42, and the minimal 0.14 per cent. (For example, in a patient in whom the metamorphosis on nonalcoholic days had amounted to 80.11 per cent, on alcoholic days it fell to 63.78.) The decrease is frequently observed, even when small doses are taken; but it is invariable in the case of moderate or medium quantities. There does not, however, exist any strict parallelism between the dose and the amount of the inhibition of the metabolism. (5) The decrease remains still

[1] Therapeutics: Its Principles and Practice, 1891. [2] Hoffman und Schwelbe's, Jahresb., 357, 1881.



PLOT X OF EXPERIMENT XXVIII.

Black line = Blood pressure.
Broken line = Temperature.

perceptible for sometime, even after the alcohol has been discontinued. (6) It is probably dependent upon the drug inhibiting the systematic oxidation processes (Manassein, Schmiedeberg, and Boecker), and further upon its changing the blood-pressure, dilating the blood-vessels, retarding the circulation, and depressing the bodily temperature. (7) Alcohol also diminishes somewhat the assimilation of fats, as it was found that there was an increase in the quantity of fatty acids excreted with the fæces.

Although perhaps not strictly within the limits of the present essay, the work of Diakonoff in this respect is worthy of mention. This author[1] undertook a series of experiments on febrile patients with the purpose of ascertaining the effects of alcohol on the assimilation and metabolism of proteids. Of the 7 patients experimented upon 6 were suffering from typhoid fever and 1 from exudative pleurisy. Of these patients 2 were total abstainers and 5 occasional alcohol drinkers. The drug was administered internally in the form of a 40 per cent vodka (aquavit) four times a day, the daily dose being invariably 50 cubic centimeters ($1\frac{3}{4}$ ounces) of absolute alcohol. The diet of the patients was limited to milk and bread, and the treatment was purely expectant. The experimenter obtained the following results: (1) In febrile patients alcohol lowered the assimilation of the nitrogenous ingredients of food. (2) In regard to this effect of alcohol, no difference was noticed between habituated and nonhabituated individuals. (3) Alcohol spoils appetite and increases both the total daily amount of fæces and the proportion of water and coagulated albumen therein. (4) The drug decreases the quantity of albumen undergoing decomposition in the system. (5) In such cases, where the assimilation of nitrogen sinks but slightly, alcohol lowers the nitrogenous metabolism; where the depression, however, of the assimilation is considerable, the metamorphosis proves to be augmented. (6) Alcohol disturbs the metabolism also qualitatively, since it raises the proportion of underoxidized products.

I have not had myself a sufficient opportunity to make an experimental research upon this part of the subject, but it seems to me, from the experimental evidence brought forward, that this points to a well-sustained conclusion in regard to the actions of alcohol on metabolism, that is, that the drug produces a decided lessening in the excretion of the products of tissue-waste both in health and disease.

ON ANIMAL HEAT-FUNCTIONS.

On normal temperature.—Alcohol affects the animal heat functions of both man and the lower animals proportionately in a similar manner. Under the action of moderate doses there is frequently produced a slight elevation of the temperature, corresponding with a stimulating effect upon the circulation. In other words, the rise of temperature is apt to occur *pari passu* with an increase of the blood-pressure. The records that follow are sufficiently clear. (*See also* Plot X.)

EXPERIMENT XXVIII.

[Dog-weight, 15.2 kilos. Pure alcohol used.]

Time.	Pressure.	Rect. temperature (C. scale).	Remarks.
m. *s.*	*mm.*		
0 00	138	40	
2 30	138	40	Injected 1 c. c. of drug.
3 00	140	40	Injection ended.
5 00	144	40.1	
9 00	148	40.2	
14 00	150	40.4	
19 00	150	40.6	Animal restless.
24 00	158	40.8	Dog quiet again.
39 00	150	40.6	
49 00	142	40.4	
59 00	142	40	Killed with ether.

[1] Medical Chronicle, January, 1890.

EXPERIMENT XXIX.

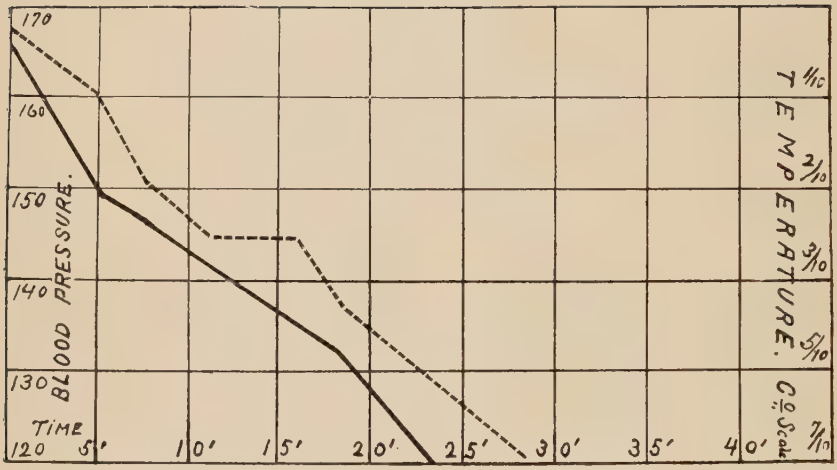
[Dog-weight, 12.69 kiles. Pure alcohol used.]

Time.	Pressure.	Rect. temperature (C. scale).	Remarks.
m. *s.*	*mm.*		
0 00	132	39.4	
1 50	132	39.4	Injected 1 c. c. of drug.
2 00	132	39.4	Injection ended.
3 30	140	39.6	
5 30	152	39.8	
10 00	160	39.9	Injected 1 c. c. of drug.
11 00	160	40.1	Dog struggles and whines.
13 00	162	40	Animal quiet.
18 00	158	40.1	
23 00	152	39.9	
33 00	142	39.8	
48 00	134	39.6	Dog killed with ether.

This rise of temperature is comparatively of short duration and apparently unimportant, since, subsequently, it is followed by a depression below normal, especially when larger amounts of alcohol are ingested. The results of these experiments are confirmatory of those observed by Richardson[1] and by Parkes and Wollowicz.[2] The latter authors found a trifling exaltation of temperature after doses sufficiently large to increase the activity of the circulation. Richardson noticed that in minute quantities alcohol increased the temperature of mammals ½° F. and of birds 1° F. above the normal.

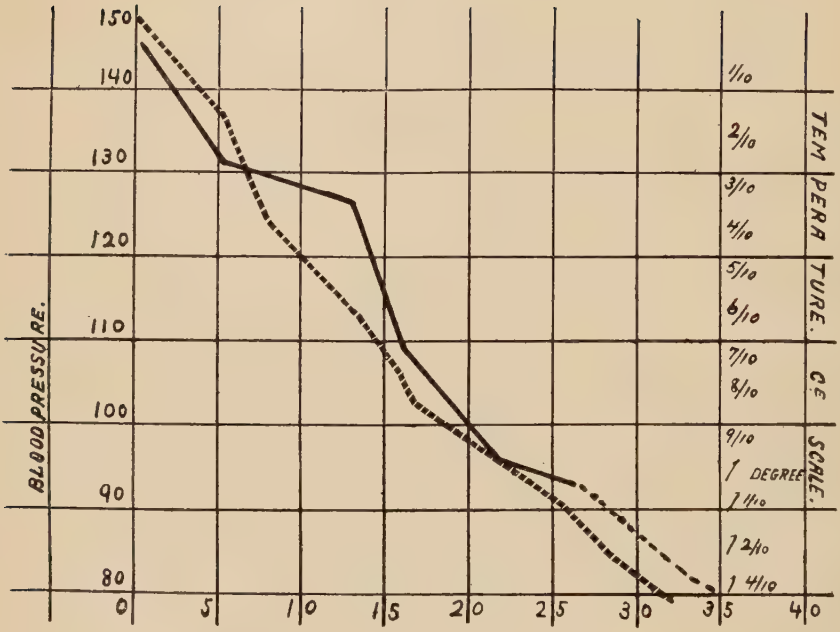
It has been sufficiently proven that alcohol in large and lethal amounts produces in animals a fall of the bodily temperature. Even as far back as 1848, Dumeril and Demarkay, quoted by Wood, affirmed that alcohol in large doses causes a marked decrease of the temperature. The truth of this statement has been more recently upheld by the results obtained in the laboratory and in the clinical ward by a host of able observers. I will not burden the reader with an account of each one of these observations, but I believe it will be sufficient for me to refer to the authorities consulted by simply mentioning them. Almost all experimenters are in accord in regard to the action of alcohol on normal temperature, and the names of Anstie,[3] Binz,[4] Bouvier,[5] Brown-Séquard,[6] Davis,[7] Godfrin,[8] Jacobi,[9] Lewin,[10] Lombard,[11] Mainzer,[12] Manassein,[13] Obernier,[14] Rabou,[15] Raziejewski,[16] Ringer and Rickards,[17] Ruge,[18] Sulzynski,[19] and Tscheschichin,[20] may be recalled.

[1] Medical Times and Gazette, Vol. II, p. 704, 1869.
[2] Transactions of the Royal Society, 1870.
[3] Stimulants and Narcotics, London.
[4] Vircow's Archiv., Bd. II, p. 153; also Practitioner, vol. 3, 1869 and vol. 4, 1870; and Journ. of Anatomy and Physiology, vol 8, p. 232, 1874.
[5] Pfluger's Archives, p. 370, 1869; Wirkung der Alcohol auf die Korpertemperatur, Bonn, 1869; and Centralbl. f. Med. Wissens., December, 1871.
[6] Journal de la Physilogie, p. 467, 1859.
[7] Transactions Amer. Medic. Associat., p. 577, 1855.
[8] De l'Alcool, son Action physiologique, ses Applications thérapeutiques, Paris, 1869.
[9] Deutsche Klinik, 1857.
[10] Centralbl. f. Med. Wissens., No. 38, 1874.
[11] New York Medical Journal, June, 1865.
[12] Vircow's Archives, September, 1871.
[13] Centralbl. f. Med. Wissens., 1869.
[14] Pfluger's Archives, p. 499, 1869.
[15] Berlin. Klin. Wochenschr., 1871.
[16] Centralbl. f. d. Med. Wissens., 1871.
[17] London Lancet, p. 208, 1866.
[18] Vircow's Archives, Bd. XLIX, p. 265.
[19] Inaugural Dissertation, Dorpat, 1865.
[20] Reichert's Archives, 1866.



PLOT Y OF EXPERIMENT XXX.

Black line = Blood pressure.
Broken line = Temperature.



PLOT Z OF EXPERIMENT XXXI.

Black line = Blood pressure.
Broken line = Temperature.

In the experiments that follow, in which toxic amounts of the drug were employed, the depression of the temperature, with slight variations, was quite marked. I may here state that if the dose ingested is fatal, the fall observed is progressive till the occurence of death. (*See also* Plots Y and Z.)

EXPERIMENT XXX.

[Dog; weight, 9.97 kilos. Alcohol, pure, employed.]

Time.	Pressure.	Rect. temperature (C. scale).	Remarks.
m. *s.*	*mm.*		
0 00	166	39.3	
3 30	166	39.3	Injected 5 c. c. of drug.
4 00	166	39.3	Injection ended.
5 30	162	39.3	
8 30	152	39.2	Injected 10 c. c. of drug.
9 00	150	39.2	Injection ended.
12 00	148	39.1	Dog whines and struggles.
15 00	142	39	Injection of 10 c. c. of drug.
15 30	140	39	Injection ended.
16 00	135	39	Animal struggles.
21 00	132	38.8	Injection of 10 c. c. of drug.
21 30	130	38.8	Injection ended.
26 30	120	38.6	Dog quiet; eye reflexes, weak.
31 30	112	38.4	Clot for 5 minutes.
37 00	108	38.3	
42 00	98	38.2	Eventually killed with ether.

EXPERIMENT XXXI.

[Dog; weight, 7.710 kilos. Pure alcohol used.]

0 00	148	39.6	
5 00	148	39.6	Injection of 10 c. c.
5 40	146	39.6	Injection ended.
6 00	142	39.6	Dog struggles.
8 30	138	39.4	Quiet again.
9 30	138	39.4	Injected 10 c. c.
10 00	132	39.4	Injection ended.
12 00	----------	39.2	Clot for 6 minutes.
18 00	128	39	Injected 15 c. c.
18 30	112	39	Injection ended.
20 00	108	38.9	
25 00	98	38.8	Eye reflexes, gone.
30 00	96	38.6	
35 00	----------	38.4	Clot.
42 00	82	38.2	Respiration slow and shallow.
47 00	----------	38.2	Killed with ether.

It is demonstrated beyond doubt, therefore, that alcohol in sufficiently large quantities diminishes the bodily temperature in the lower animals the same as it does upon man.

This action, however, is not the same in the case of abstainers and of habitual drinkers. In the first class of individuals the depressing influence is usually produced, but in those persons addicted to the habitual use of alcoholic stimulants, the effect is either slight or totally wanting. This is an almost every-day observation.

In this respect I may call attention to the elaborate research of Rieso,[1] who performed 86 experiments in man, with the object of studying the behavior of the drug on bodily temperature. He found that alcohol, even in moderate doses, in many cases, causes a lowering of the temperature of the body, the amount of this diminution averaging, as a rule, only some tenths of a degree; that only exceptionally is there noticed an elevation of the temperature consequent upon the administration of alcohol, and that not unfrequently, at least after minute doses, there is no noticeable change; that the diminution of temperature in convalescents is, as a rule, less

[1] Deutsches Archives f. Klin. Med., 1873.

than in healthy subjects, or it may altogether be absent; that in those who habitually drink alcoholic stimulants, the depressing influence of the drug upon temperature is almost always wanting; that frequent repetition of the doses of alcohol diminishes their lowering effect upon temperature; that the amount of diminution of temperature is directly proportional to the dose of alcohol ingested; and that, finally, the depression of temperature caused by the drug is for the most part of but short duration, and the temperature soon returns to its previous grade. These statements are in accord with the results obtained by most investigators, as well as with those of my own experiments, and they may, therefore, be said to be entirely correct.

Although the action of alcohol on thermogenesis may be said to be an indirect one, judging from the light of modern research, it would be interesting to ascertain, if possible, how these heat phenomena are brought about. Here I may say that the deductions of Binz[1] must be laid aside as of no great value on the basis of recent elaborate researches.

The first calorimetrical studies regarding the actions of alcohol were made by Lewis[2] on rabbits. The author found that the drug sometimes produced a primary decrease of heat production, especially after small doses, followed, under the influence of large quantities, by an increase in the same phenomenon. Later, Wood and Reichert,[3] who experimented on dogs, found varying results in 5 experiments, although in some of these heat-dissipation kept in advance of the heat production, and as a consequence the temperature was lowered. Sometimes, however, the heat production was above the dissipation, resulting, in such instances, in a rise of the bodily temperature.

The subject has been further investigated recently by Reichert.[4] The able and thorough research of this author is based upon 18 experiments performed on dogs, using the ordinary calorimeter described by him.[5] Reichert obtained increased heat production in 13 of the experiments. The difference did not depend upon the size of the dose employed. The range of variation in the general results was as much as 65 per cent. He determined, however, that alcohol does not affect the total quantity of heat produced; that the fall of the bodily temperature is due to the excess of the dissipation. He infers, therefore, that in all likelihood, alcohol, by undergoing oxidation, yields energy in the form of heat, thus conserving the tissues and acting as a food. The question, nevertheless, cannot be considered definitely settled, and further experimentation in this respect is still wanting in order to reconcile, if possible, all beliefs. The results of Reichert, however, carry the weight of authority, and may be said to be correct in the present state of our knowledge of this interesting part of the subject.

On febrile temperature.—That alcohol exercises a depressing influence on febrile temperatures, both in man and in the lower animals, there can be no doubt. Thus Bouvier[5] has noticed that the drug exerts a marked antipyretic action in animals laboring under pæmic fever. Alcohol in such cases diminished the temperature as much as 8.5° C.; and it was further found that the fever could be prevented if the alcohol was pushed before the appearance of the pathological condition.

The same results have been observed by Ringer and Rickards[5] in the case of man, but these authors assert that large and perhaps toxic doses of alcohol have to be ingested for the antipyretic effects to occur. As observed by Bouvier, Riegel,[5] and others, alcohol, even in large amounts, fails to effect the temperature in individuals accustomed to the use of the drug.

There can be no question that alcohol is able to reduce febrile, as it does normal temperature, both in the case of man and the lower animals. In the first instance

[1] Deutsches Archives f. Klin. Med., 1873.
[2] Journal of Mental Science, Vol. xxvi.
[3] Wood's Therapeutics, p. 343, 1891.
[4] Therapeutic Gazette, February, 1890.
[5] University Medical Magazine, January, 1890.

the action is sustained by clinical observations and in the second by experimental evidence.

I, myself, have verified this antipyretic action of alcohol in a special series of experiments. For these observations a feverish condition was produced in dogs by the administration of putrid blood, intravenously. Two days were employed in each experiment. During the first day it was ascertained only whether the specimen of blood used was sufficiently powerful to produce fever without causing other marked disturbances. During the second day the fever-producing agent and the alcohol were given to the animal at the same time. It was found then that the alcohol not only kept the temperature from rising, but even reduced it below the normal standard, these changes depending more or less upon the amount of the alcohol ingested. It will be sufficient for me to detail the following experiment:

Experiment XXXII.

FIRST DAY.

[Dog, weight 10.21 kilos.]

	Temperature, C° scale.
In the normal state:	
First hour	39.4
Second hour	39.4
Injected 5 drops of putrid blood. In the fever state:	
End of the first hour	40.5
End of the second hour	41.5
End of the third hour	41.8

SECOND DAY.

[Dog reduced to 10 kilos.]

First hour	39.6
Injected 5 drops of putrid blood and 5 cc. of pure alcohol, repeating the latter every 10 minutes.	
End of second hour	39.6
Injected 5 drops of putrid blood and the alcohol as before.	
End of third hour	39.6
End of fourth hour	39.0
End of fifth hour	38.3
End of sixth hour	38.8

Other experiments of the same nature gave identical results. The evidence is, therefore, conclusive.

ON DIGESTION.

Every day experience and experimental research teach us that alcohol in small amounts aids digestion. It is true, on the other hand, that some observers deny to alcohol any such action, but in carefully examining the literature of this part of the subject (which is certainly, to say the least, an extensive one) it is seen that those who uphold this latter view form the minority.

Buchner,[1] from the results of a series of experiments, comes to the conclusion that 10 per cent of alcohol does not affect artificial digestion, while beer, even when used in dilute form, retards the process. His assertions, however, have not been absolutely confirmed. It is true that Gluzinski,[2] who gave the drug to fasting individuals, found that digestion, as influenced by alcohol, may be divided, in case of healthy persons, into two phases: The first, characterized by marked retardation of proteid digestion, the nitrogenous materials failing to be changed into peptones until the alcohol was removed; the second stage, beginning after the removal of the drug, when the secretion of gastric juice is so abundant that in the end the food is digested as soon or sooner than if no alcohol had been administered.

On the other hand, Mohilanshy[2] affirms that alcohol, taken in small quantities,

[1] Deutsch Archiv. f. Klin. Med., XXIX, 537.

[2] Deutsch Archiv. f. Klin. Med., XXIX, 537, and Annual of the Universal Medical Sciences, 1888.

distinctly improves the appetite, and gives rise to a marked increase in the assimilation of the nitrogenous constituents of food, this increased assimilation being due to a more complete absorption and intensified gastric digestion, resulting, as has been stated elsewhere, from a prolonged retention of food in the stomach on the one hand and from increased digestive power and secretion of the gastric juice on the other.

Blumenau[1] has arrived at similar conclusions. This investigator, with the view of studying the action of alcohol on the functions of the stomach, made a series of experiments upon 5 healthy individuals, aged from 22 to 24. The observations were made in the clinic of Koshlakoff of St. Petersburg. The drug was given in from ten to twenty minutes before dinner, in doses of 100 cubic centimeters (3⅖ ounces) and in the form of solutions of the strength of from 25 to 50 per cent. The meals allowed consisted of from 500 to 600 grams (16 ounces) of soup, a cutlet weighing 90 or 100 grams (2½ to 3 ounces), and 200 or 250 grams (6 to 8 ounces) of wheat bread. The author found that during the first three hours after the ingestion of the alcohol the gastric digestion is distinctly retarded, which is caused by a marked diminution of the digestive power of the gastric juice. The diminution is dependent upon the decreased proportion of hydrochloric acid and general acidity of the juice, the acidity being almost entirely produced by lactic acid. In habitual drinkers the changes are less pronounced than in alcohol abstainers. All other conditions being equal, stronger solutions of alcohol give rise to more intense changes than weaker ones.

The investigator found further that during the fourth, fifth, and sixth hours after meals the gastric digestion becomes considerably more energetic; the general acidity of the juice arises from 0.22 to 0.35 per cent; and the proportion of hydrochloric acid increases, to reach its maximum (from 0.12 to 0.14 per cent) by the end of five hours after meals, while the lactic acid amount decreases correspondingly, attaining its minimum about the same time when the acid either gives but a very faint reaction or altogether ceases to give any reaction. Corresponding to the alterations, the gastric juice during the second stage acquires a far higher digestive power. Under the influence of alcohol the secretion of the gastric juice becomes more profuse and lasts longer than without alcohol. During the first hour the action of pepsin seems to be slightly increased, because, on adding rennet to cow's milk, it coagulates more slowly than in subsequent hours. In regard to the motor power of the stomach, such was ascertained to be somewhat decreased, as tested by the internal administration of salol according to the method of Ewald. The same may be said in regard to the absorptive power of the organ, in which case the decrease was determined by the administration of iodide of potassium. It was found that the intensity of the alteration in the motor and absorbing powers of the stomach corresponds to the concentration of the alcoholic solutions used.

Of course, in large amounts alcohol hinders digestion very decidedly, and the continuous use of the drug causes pathological changes of varied nature, the principal one of which is that produced upon the liver.

That alcohol is a powerful factor in the production of hepatic cirrhosis there is scarcely any doubt. This has recently been confirmed by the results obtained by De Rechter[2] in an experimental research. The investigator made a series of experiments on dogs and rabbits. After having ascertained the amount of alcohol used by hard drinkers, he administered to the animals employed a mixture consisting of 22.5 parts of ethylic alcohol at 96 degrees, 2.5 parts of methylic alcohol and 75 parts of water. Of the 10 rabbits and 4 dogs used, 1 dog and 4 rabbits lived long enough to be of further use to the experimenter; in the rabbits he found cirrhosis in the portal spaces. In places, bands of connective tissues were found uniting the portal vein with the sublobular veins, but the parenchyma of the organ was everywhere

[1] Wratsch, No. 42, 1889, and Med. Chronicle, January, 1889.
[2] La Presse Médicale Belge, June 19, 1892.

free from change. In the dog there was cirrhosis occupying the sublobular veins, where alcoholic cirrhosis is said by Sabourin to commence in man. De Rechter attributes this difference in development to some modifying influence on the alcohol exercised by the liver of the rabbit. If experimenters have found fatty and cirrhotic change in many cases, the author attributes it to the fact that they used alcohol too short a time and in too large doses.

Be all the results of these researches as they may, certain it is that in the test tube the digestion of food is retarded or inhibited by the addition of alcohol; this I have verified over and over again. Yet, in the stomach, on the contrary, alcohol aids digestion, and here it may be said, it does so not perhaps through any inherent powers of its own, but mainly by virtue of its irritant and stimulating properties, inducing in this manner an increased amount of gastric juice.

ON THE URINARY SECRETION.

How alcohol affects the urinary secretion has not been definitely determined. Mohilansky[1] found that the drug, in healthy people, does not possess any diuretic action; and that, on the contrary, it rather tends to inhibit the elimination of water by the kidneys. Diametrically opposed to this statement is that of Diakonoff[1] who observed that alcohol, in febrile patients, considerably increased the daily quantity of urine, markedly suppressing at the same time the aqueous loss through the lungs and by the skin.

From a few experiments performed upon myself, I have noticed that small quantities of alcohol almost always caused an increase in the daily amount of urine secreted. The action under consideration, however, can not be accurately ascertained, since it must depend not only upon the amount of alcohol ingested but also upon the condition of the individual, whether this be in a healthy or a befrile state.

It is not at all improbable that if in a healthy person, the amount of alcohol administered be sufficient to stimulate the circulation, a corresponding activity of the kidneys would be observed as a consequence of the generally increased arterial pressure. On the other hand, since alcohol in large doses, as has been noticed tends to markedly decrease the arterial pressure, accompanied by a probable dilatation of the cutaneous blood-vessels, according to Mohilansky, (although this has not been positively demonstrated) it would naturally be expected that such phenomenon would favor perspiration, and thus interfere with the renal secretion.

The same results might be witnessed in febrile conditions, in which, as has been observed by Diakonoff, the drug by causing a suppression of watery excretion through the lungs and skin, and undoubtedly a stimulation of the general circulation, may produce a marked increase in the daily amount of urine secreted. The question, in the present state of our knowledge of this part of the subject, remains unanswered one way or the other.

WHAT BECOMES OF ALCOHOL IN THE ANIMAL ECONOMY?

The last point which I propose to discuss in this paper is that relating to the fate (as the French would have it) of alcohol in the animal economy. This subject naturally deals with that of the elimination of the drug. Is alcohol eliminated as such, or does it undergo oxidation, as is maintained by a probable majority of writers upon this question? This is certainly of paramount importance, for here lies the basis of the value or the harmfulness or unnecessary use of alcohol in the treatment of disease. Again, not only may it be asked is alcohol a general stimulant, but also, does the drug likewise serve the purpose of a food? The question, although a long mooted one, deserves the most careful consideration.

It has for a long time been held that alcohol is completely, or nearly so, burnt up in the system. But in the celebrated work of Duroy, Lallemand, and Perrin, it is

[1] La Presse Médicale Belge, June 19, 1892.

stated by these authors that alcohol is eliminated unchanged, basing their assertion on the fact that they could not find in the blood or in the tissues the products of alcohol oxidation, such as acetic acid aldehyde; and on the fact also that they found the alcohol unchanged in the expired air, in the urine and in the sweat. These authors relied on the chromic acid test, which is said by Binz[1] to be fallacious. Binz, assisted by Stenbach and Schmidt, in a series of experiments, could not detect alcohol in the breath, affirming, therefore, that no drug was expelled by the lungs. He attributes the odor noticed in the breath of heavy drinkers, to the ethers and other volatile principles of the various liquids ingested.

Baudot[2] also questioned the correctness of the statements of Duroy and Perrin, on the ground that the chromic acid test is so delicate as to reveal the presence of 0.165 of one grain in a quart of water. He further noticed, in the twenty experiments performed, that, unless it be in enormous amounts, alcohol is practically not eliminated by the urine. These results have been confirmed later by other investigators, such as Anstie,[2] Schulinus,[3] and Lieben.[4] Schulinus showed that only very small quantities of alcohol pass through the kidneys, the largest portion of the drug taken into the blood finding its way into the tissues and organs by exosmosis, and in a number of experiments he found that one-fourth of the alcohol administered had disappeared from the body after from two to three hours and fifteen minutes. From the fact, again, that only a trifling amount of the drug was eliminated by the kidney, the author arrived at the conclusion the alcohol given must have been burnt up in the system. The same conclusions are formulated by Lieben and Anstie. This latter investigator detected a small quantity of alcohol escaping from the lungs.

Thudichum, quoted by Wood,[4] first in 1864, and later, in 1866, in colaboration with Dupré,[5] carried two elaborate researches on the same subject. In the first investigation the experiments were performed upon 33 men, to whom he administered 4,000 grammes of alcohol. The drug was recovered from the urine of all the men by repeated ditillation in order to avoid the fallacies of the chromic acid test. In this manner the experimenter obtained from the urine, within six hours after the ingestion of the drug, only 0.25 per cent of the amount of alcohol given. Identical, and perhaps more accurate, results were obtained by the same observer in his second investigation. In this instance greater care was taken to avoid loss during distillation, and he then recovered from the urine 0.82 per cent of the alcohol administered.

This experimentation was repeated by Subbotin[6] on six rabbits. The investigator claims to have demonstrated that the elimination of alcohol continues for a longer period than is generally believed, and that twice as much of the drug escapes through the skin and lungs as by the kidneys. His results, however, do not disprove those of the observers just mentioned, since he employed very large amounts of alcohol, in which case the elimination must be in direct proportion to the quantity ingested, for certainly a limit to the powers of the system to oxidize alcohol must be expected.

In a series of experiments Edes[7] observed that elimination of alcohol is greater by the lungs than by the kidneys, after small amounts; the contrary taking place under large doses of the drug. Not much weight perhaps can be attached to these statements, from the fact that the author relied chiefly on the chromic acid test. But Anstie,[8] in a second series of experiments upon dogs, using the method employed by Subbotin, confirmed the results obtained in his (Anstie's) first investigation.

[1] La Presse Médicale Belze, June 19, 1892.
[2] L'Union Médicale, 1863.
[3] Archiv. der Heilkunde, 1866.
[4] Annal. der Chim. und Pharm., II, 1870, Supl. Bd., p. 236.
[5] Tenth Report of the Medical Officer of the Privy Council, London, 1868.
[6] Zeitschr f. Biolog. VII, 1870; and Schmidt's Jahrb. Bd. CLIV, p. 261, 1872.
[7] Boston Medical and Surgical Journal, p. 347, 1870.
[8] Practitioner, July, 1874.

He found that a very trifling amount of alcohol was left in the body. Similar results have been obtained by Bodländer[1] from experiments performed upon himself and on dogs. His studies have been repeated and his observations apparently confirmed by Wöhler.[2] Bodländer found on himself that elimination occurred by the kidneys 1.2 per cent and by the lungs 1.6 per cent of the amount of alchohol ingested. In the dog he recovered from the urine 1.6 per cent and from the breath 2 per cent. No alcohol was detected by this experimenter in the intestinal excretions, nor in the milk of a goat to which nearly a quart of brandy had been administered.

It was first discovered by Lieben[3] and afterwards by Dupre[3] and Bechamp,[4] that a body closely resembling alcohol occurs in the urine of habitual abstainers. Indeed, Bechamp was able to get from the urine of persons who had not taken the drug in any form for a long time, alcohol in sufficient quantities to burn it. Lieben found the same substance also in the urine of the dog, the horse, the lion, and Rajewski[5] in that of the rabbit.

It seems to have been proven, from the results of the foregoing experimentation, that alcohol exists in the healthy organism, and, therefore, the detection of the drug in the different secretions and excretions, after its ingestion, is no proof that alcohol does not undergo oxidation in the economy. It is true that so far no products of oxidation have been found in the blood, but in this case it is reasonable to suppose that the process of oxidation goes on continuously, without interruption, until the production of water and carbon dioxide occurs as the ultimate result of such oxidation.

The elaborate and excellent research of Ford[6] tends to confirm the theory of the oxidation of alcohol in the animal economy. This investigator studied the subject on the supposition that the sugar manufactured by the liver must, before its final destruction and conversion into carbon dioxide and water, be changed into alcohol. This in mind, he carefully examined large quantities of blood of animals, seeking to obtain from that fluid alcohol by a process of repeated distillation. To prove that the substance obtained from the blood in this manner was alcohol, the author employed the chromic acid test, and relied also on the inflammability peculiar to alcohol, and similarly on the optical appearance of this substance in the conducting tube at the time the distillate began to boil. Again, to prevent possible oxidation of the alcohol during this delicate process, Ford sometimes added sulphuretted hydrogen.

The experimenter then proceeded to examine various other tissues as substances to be distilled, and here he based his calculations on the amount of carbon taken in and that exhaled, especially in regard to the quantity of alcohol to be found in the blood of the pulmonary capillaries. Thus he determined the quantity of alcohol respectively from the capillary blood of the lungs; from fresh lung tissue; from putrescent lung tissue; from fresh thoracic blood; from putrescent thoracic blood; from fresh liver tissue; and from putrescent liver tissue.

An examination of the figures given in the original tables of Ford's work reveals the interesting and important fact that the smallest quantity of alcohol was obtained from fresh liver tissue, and the greatest amount from putrescent liver tissue. This appears to show that in the latter instance the glycogen must have undergone fermentation. The same is seen in regard to the quantity of alcohol extracted from fresh and from putrescent thoracic blood.

An unbiased examination of all the preceding investigations appears to clearly demonstrate that but a very small quantity of alcohol is eliminated as such from the organism. The drug must, therefore, be oxidized in the body, thus serving the purpose of a food, and in this manner generating force. This is the case, according to

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[1] Archiv. f. Physiolog., XXIII.
[2] Journal des Progress, XI.
[3] The Doctor, February 1, 1873.
[4] London Lancet, 1873.
[5] Archiv. f. Physiolog. XI, 122, 1875.
[6] New York Medical Journal, January, 1872.

Dupré[1] who has shown that one gram of alcohol oxidized in the organism yields 7,184 heat-units, while the same weight of lean beef evolves 1,482 heat-units only. The inference is obvious. Further estimates have demonstrated that two ounces of alcohol generates a force equal to that generated by a little over nine ounces of lean beef, this latter being sufficient to maintain the circulation and respiration of an ordinary adult man per day. The results of these calculations seem to be supported by the able experiments of Reichert.[1]

It must, therefore, be concluded that alcohol, so far as our clinical and experimental knowledge goes, is mainly destroyed in the system, generating vital force, and that it ought to be considered as a food.

CONCLUSIONS.

I shall now, to close this imperfect study of the physiological actions of alcohol, give a summary of the conclusions I have been able to draw, and which will be found scattered throughout the preceding pages. They are as follows:

(1) Alcohol in small amounts excites, and in large doses depresses, both the peripheral motor and sensory nerves.

(2) Excessive quantities cause a spiral degeneration of the axis-cylinder of nerve-fibers.

(3) Reflex action is at first increased, and afterwards diminished by an influence exercised by the drug upon the spinal cord and the nerves.

(4) In small amounts alcohol stimulates the cerebral functions; it afterwards, especially in large quantities, depresses, and finally abolishes them.

(5) Alcohol causes lack of coordination by depressing both the brain and the spinal cord.

(6) In toxic doses alcohol produces hyperæmia of both brain and spinal cord, especially of the lumbar enlargement of the latter.

(7) Small doses of alcohol produce increased rapidity of the cardiac beat; large amounts, a depression of the same. In either case the effect is brought about mainly through a direct cardiac action.

(8) The drug in small quantities causes a rise of the arterial pressure by a direct action upon the heart; in large amounts it depresses the arterial pressure similarly through a cardiac influence.

(9) In large doses alcohol enhances coagulation of the blood; in toxic quantities it destroys the ozonizing power of this fluid, causing a separation of the hæmoglobin from the corpuscles.

(10) Alcohol in small amounts has little or no effect on the respiratory function. In large doses it produces a depression of both rate and depth of the respiration through a direct action on the centers of the medulla oblongata.

(11) The drug kills usually by failure of the respiration.

(12) On the elimination of carbon dioxide alcohol exercises a varying action, sometimes increasing, sometimes decreasing such elimination.

(13) The action of alcohol on the amount of oxygen absorbed also varies and may be said to be practically unknown.

(14) The drug lessens the excretion of tissue waste, both in health and disease.

(15) In small amounts alcohol increases the bodily temperature; in large doses it diminishes the same. The fall of bodily temperature is due mainly to an excess of heat dissipation caused by the drug.

(16) Alcohol, in sufficiently large amounts, has a decided antipyretic action, but for the purpose of reducing abnormal high temperature should not be used.

(17) In moderate amounts alcohol aids the digestive processes.

(18) Alcohol diminishes the absorption of fats.

(19) The drug exercises a varying action on the amount of urine secreted; but it probably increases the activity of the kidneys.

[1] Practitioner, Vol. IX, p. 33, 1872.

(20) In large doses, or when continuously used for a long time, alcohol produces, particularly, cirrhotic changes in the liver, and paralysis of spinal origin. It also causes insanity, and epilepsy, and other maladies.

(21) Alcohol is mainly burnt up in the system when taken in moderate quantities. But when ingested in excessive amounts it is partly eliminated by the breath, the kidneys, and the intestines.

(22) Alcohol is a conservator of tissue, a generator of vital force; and may, therefore, be considered as a food.

THE TREATMENT OF EXOPHTHALMIC GOITER BASED ON FORTY-FIVE CONSECUTIVE CASES.

By A. D. ROCKWELL, A. M., M. D.,

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In considering this strange and intractable disease, I shall enter into no speculations as to its pathology for the simple reason that all explanations of the phenomena of this character that attend it are in the main conjectural. Neither shall I take time in discussing its etiology or its well-known symptoms, for these can be found in every text on neurology, with little variation of detail. The evidences of pathological anatomy have thus far been so thoroughly negative that we are left to the symptoms alone for guidance in treatment. These are, however, so positive and suggestive as to afford ground for a rational therapeutics, the end of which must be to regulate and give tone to nerve force and to equalize the circulation.

In an experience including the treatment of forty-five cases of exophthalmic goiter, dating from 1876 to the present time, a period of sixteen years, I have been enabled to study the disease clinically very thoroughly and form an opinion as to the benefits to be derived from certain methods of treatment, not altogether in accord with prevailing opinions.

In short, I hold that the prognosis in this disease is better than is generally believed, and if my results have been more satisfactory than others that have been reported it has been due to a more rational use of the remedy which has been my main reliance, and greater thoroughness and persistency in its application.

The remedy to which I refer is electricity. And while I by no means exclude the administration of drugs in the management of this disease, they are in my hands regarded as supplementary to the chief remedy and subject to changes according to the indications in each individual case. The surprising lack of unanimity of opinion in regard to the efficacy of medicinal treatment is due to the fact that not only have those drugs that have proved beneficial in some cases failed to do good in others, but sometimes a drug that has in one case proved palliative has in another seemed to do harm. Iron, for example, is a universal remedy that is perhaps in a majority of cases fully indicated, and is well borne; but I have occasionally found it to be productive of unpleasant symptoms even when anæmia existed, and have been compelled to discontinue its use. The statement of Von Graefe that iron is useless in the height of the malady, but that it does good when a certain amount of improvement has occurred, is an observation of value and founded upon an extensive experience.

My own experience has not been very favorable to the use of quinine, strychnia, or arsenic, and I now rarely administer them, and I believe the iodides often do more harm than good. Belladonna has been highly recommended and is undoubtedly of value. Carbazotate of ammonium I have used but in one case, but discontinued it after ten days on account of the gastric disturbance that it seemed to occasion. Digitalis is by some believed to be useless in this disease on the theoretical ground that it directly stimulates the muscular fibers of the cardiac muscular system. While the value of this remedy is now well recognized, there still exists

much difference of opinion as to the method of its action. It has been regarded as a tonic, a stimulant, and a sedative. The latter view, as is well known, was taught by Trousseau long ago. He held that it occasioned contraction of the superficial blood vessels, thus producing diuresis—very much on the same principle as the action of fright or cold. In a recent discussion, Prof. Crocq[1] said that digitalis was not a sedative; neither a cardiac tonic, any more than alcohol is a tonic to the brain. Another view is that digitalis acts upon the pneumogastric and sympathetic nervous system, thus regulating the action of the heart. By one, the remedy is believed to act only on the left heart, by another on the right heart as well, retarding the action of both. But whatever theory is accepted, obstinate experience will not wheel into line at the command of any scientific theory, however plausible.

On the theory of the stimulant and tonic action of digitalis, I hesitated for a time to use it in this disease, but when I finally came to put it to the test of actual trial I was agreeably disappointed in the results. If the heart seems abnormally strong in exopthalmic goitre this is not by any means always the case. Very frequently there is enfeeblement of the myocardium, and digitalis is in many cases useful in slowing the rapid systole associated with it. The condition of the heart thus becomes improved by the physiological rest it obtains through prolongation of the diastole. Yet, like iron, digitalis may under certain conditions prove not only useless but harmful, although, like iron, and especially in combination with iron, it possesses undoubted value. In what may be termed sthenic cases, where the excitability of the heart is great without enfeeblement, digitalis is certainly contra-indicated, and one such case will be found in this report. In this case good results were obtained by substituting veratrum viride for the digitalis. Strophanthus has received high commendation, and on theoretical grounds it is recommended in preference to digitalis. While both tend to lengthen the interval between the contractions of the heart, strophanthus is supposed to contract the caliber of the arterioles in less degree than digitalis, and to be preferred as not increasing the work of the heart to the same degree as the latter.

In conjunction with digitalis and iron, ergot and bromide of zinc seem to me to be distinctly valuable, and I have no hesitation in saying that a combination of these four remedies will more nearly fulfill the indications in the majority of cases of exopthalmic goiter, than any other single remedy or combination of remedies. There are probably to be found few if any who will not accord to electricity an important place among the remedies indicated in exopthalmic goiter, and unlike some others mentioned, it can not, if judiciously used, do harm even in those cases where it does no good.

Gowers, who does not in general accord to electricity a very high place in therapeutics,[2] yet says that in this disease it is followed in many cases by a distinct fall in the frequency of the pulse (amounting to 10 and even 20 beats per minute) and sometimes by a slight diminution in the size of the thyroid. In one case he observed the pulse fall from 90 to 72—a lower rate than had been counted during the preceding two years. He adds, however, that such effects are usually transient—although repeated applications certainly sometimes cause a slight degree of permanent improvement. He has not seen more than this.

Even such results as Gowers describes are not to be despised, but the difficulty with his efforts and with others who have written upon this subject is the utter inadequacy of the strength of current used, and above all, so far as my observation goes, in the incomplete and haphazard way in which the applications are administered. Gowers would use a weak galvanic current, sufficient to cause merely a slight tingling of the skin, while others who have written extensively upon the subject are content with 2 or 3 milliamperes. These authorities do not seem to appreciate the fact that in the therapeutic use of electricity they are dealing with a hide-bound

[1] Academy of Medicine, Belgium, January 28, 1893.
[2] Diseases of the Nervous System, p. 1214.

body which offers such a resistance to the passage of the current that our ingenuity is taxed to its utmost in order to overcome this resistance and get into the body a sufficient quantity of electricity to appreciably affect the cerebro-spinal system and the nervous system of vegetative life—the pneumogastric—the great sympathetic including the vasomotor system of nerves. These large current strengths can not, of course, be used with small electrodes applied in the ordinary way over the region of the sympathetic and vagus in front of the neck, and from the mastoid process along the inner border of the sterno-cleido mastoid muscle to the manubrium sterni. Here, although the current strength should be much higher than is usually recommended, it is rarely possible to exceed 10 or 15 milliamperes. For the greater strength of current, large electrodes, preferably of sculptors' clay, should be applied both to the back of the neck (cilio-spinal center) and solar plexus. With electrodes in this position I have frequently used as high as 60 milliamperes, and with results the most beneficial.

I do not, however, recommend such apparently heroic treatment. Idiosyncracies vary, and there is probably no remedy to the effects of which there is a more varying degree of susceptibility than to electricity. Every case is a law unto itself, and should be studied independently, with the exercise of judgment and common sense in its management.

But if my results in the treatment of this disease has been exceptionally good I attribute it in part to the fact that I have not confined my efforts to the use of drugs and the galvanic current alone, but have, in many instances, combined with these methods the most thorough and persistent treatment by the method of general faradization. While the methods of Eulenburg and Gutman in using simple localized faradization in the vain attempt to affect directly the sympathetic, and the faradization of the precordial region by Vigouroux and Charcot, may possibly do some good they can not compare in efficiency with general faradization, a method which has been abundantly tested and which rests upon a sound physiological basis. What localized faradization is to an individual part or organ, general faradization is to the whole body. In exclusively localized faradization, the increase in the process of waste and repair and improvement in nutrition are mainly confined to the part which is traversed by the current, but in general applications these effects are appreciated by every part of the system. The improvement which each part or organ receives from the treatment reacts upon every other part, and every effect becomes in its turn a cause.

While, therefore, I consider electricity of rather more importance than any other remedy in the treatment of this disease, yet, in many cases, the most rigid and conscientious observance of certain fixed rules in regard to eating and drinking and the avoidance, not only of excess in every department of mental and physical hygiene, and even the repression of ordinary and legitimate emotions and passions, become very essential. For the majority of these forty-five cases of exopthalmic goiter I am indebted to the kindness of various members of the profession, most of whom have watched with interest the progress of the cases and have noted both the successes and failures.

I do not propose, however, to relate the failures nor to report in detail the cases (only too many in number) which experienced only partial and incomplete relief. Some absolute failures occurred, but not many. It is rare indeed that through the combined methods of hygiene diet, drugs, and electricity the disease fails to be in some degree favorably influenced, for out of these forty-five cases, there were but three that received no benefit whatever, and these were not even temporarily relieved. Twenty seven of these cases were benefited—some of them in very great degree, others only slightly. Some of those that were much benefited relapsed, and received further treatment with good results, while others have been lost sight of and their subsequent history is unknown. In fairness, however, it must be said that while the most persistent treatment failed to do more than slightly improve many

of these cases, some of them, which otherwise possibly might have been benefited, discontinued treatment after a comparatively short period.

Fourteen of these cases either fully or approximately recovered, and as the first six have been reported[1] I shall very briefly allude to them, giving in full only the eight more recent cases.

Case 1.—Mrs. G., aged about 40, was referred to me, May 3, 1876, by the late Dr. S. S. Purple, and during the treatment and for many years after until her death, was under the constant observation of Dr. J. J. Griffiths, of New York. Pulse was violent and from 115 to 140. Exopthalmos prominent, and thyroid considerably enlarged. First symptoms three years previously. Approximate recovery, the only symptoms remaining after several months of treatment being slight exopthalmus and thyroid swelling, with occasional cardiac palpitation.

Case 2.—Mrs. H., aged 42, came March, 1877. Pulse 85 to 90. Goiter quite large, but no exopthalmos. Recovery.

Case 3.—Mrs. E., aged 31. Sent by Dr. I. B. Read, of New York, October, 1878. The three cardinal symptoms present. Pulse 120 to 125, and occasionally 150. Recovery.

Case 4.—John L., aged 29, came July 6, 1879. The three cardinal symptoms present in marked degree. Pulse 125. Recovery.

Case 5.—Mrs. C. H., came September, 1879, with the three cardinal symptoms well marked. Pulse 110. Recovery. This case examined on one occasion by Dr. P. B. Porter.

Case 6.—Miss M., aged 22, referred to me by the late Dr. C. B. Belden and by Dr. J. E. Stillwell, of New York, October 18, 1879. All three symptoms present—the exophthalmos and thyroid enlargement in greater degree than the excitation of the heart, which beats only at the rate of 88 per minute. Recovery.

Case 7.—Miss B., aged about 20, was referred to me June 11, 1882, by her physician, Dr. A. R. Carman, and by Dr. Richard Van Santvoord, of New York. This case was a very aggravated form of Graves disease. The eyes were unusually prominent, the goiter large, and the pulse seldom, if ever, under 140 and frequently reaching 160. The beginning of her symptoms dated back between two and three years and had gradually reduced her until she was unfitted for all active effort. The patient received some 70 applications, resulting in a permanent recovery. Her present condition, ten years since the cessation of treatment, is this: Pulse 75 to 85, with hardly a perceptible enlargement of the thyroid or protrusion of the eyes. The patient's general health is and has been excellent for years, and she can engage, without restraint, in all the ordinary pleasures and activities of life.

Case 8.—Miss D., aged 29, was referred to me by Dr. Stephen Wickes, of Orange, N. J., March, 1885, with the three cardinal symptoms of the disease well developed—the exophthalmos, however, being much less marked than the other two. The pulse when ordinarily tranquil was 125, sometimes considerably higher and on one occasion under excitement it beat at the alarming rate of 175 per minute. The heart was slightly enlarged, and the systolic murmur which is so frequently present in these cases, was unusually loud and could be distinctly heard even when the ear did not touch the chest. The disease was not of recent origin for some four years before, when nursing a sick relative, and subject to much physical and mental strain, she first observed symptoms of disturbed heart action, and shortly after the throat and eyes both became affected.

The patient was under observation and treatment until April, 1886, a little more than a year and in that time received 85 applications of electricity with the result of a gradual but steady improvement, not only in the condition of her general nervous system but in the special symptoms characteristic to the disease. The systolic murmur entirely disappeared; the pulse sank to a permanent rate of about 80, and the eyes resumed their natural appearance. Her general health is excellent.

Case 9.—Miss R., aged 20, was brought to me on November 16, 1887, by Dr. F. Myers, of Texas.

The thyroid was only slightly enlarged, but the eyes protruded to a degree that greatly altered her expression and was the source of much annoyance. The heart pulsated at the rate of 120 per minute, but on occasions of excitement and physical fatigue I have counted it as high as 150. These symptoms had existed some three years, but all her bodily functions were normal, and, contrary to what is usually observed, her general health and strength first class. This was one of the few cases that have come under my observation where digitalis seemed to do harm. Whenever it was given in any considerable dose, either alone or in combination, the excitability of the heart was undoubtedly increased, and this effect I attribute to the fact that, associated with the over-excited cardiac contractility, there was absolutely no enfeeblement of the heart muscles. Strophanthus proved equally unpleasant

[1] New York Medical Record.

in its effects, while veratrum viride was found to exercise the most salutary influence. No other drug was given for its direct effect upon the heart, and the treatment was practically confined to electricity alone and extended over a period of fourteen months. From November 16, 1887, to March 23, 1888, she received 66 applications, with an interval of rest until October 17, 1888, when she received 47 additional treatments between that date and January, 1889. During the first two months of treatment there were but slight evidences of improvement, but during the following two months the eyes became less prominent, the goiter perceptibly decreased in size. In March, when she temporarily discontinued treatment, the pulse had not only fallen to 100 beats per minute, but was not readily susceptible to ordinary emotional or physical causes. Seven months after, when she returned, I found her in about the same condition as when she left. Resuming treatment on October 17, she perceptibly gained during the next three months, and was finally discharged as approximately cured, the pulse seldom rising above 90, with but slight evidences of exophthalmos or thyroid enlargement. Th patient has since married.

Case 10.—Mr. B., aged about 35, was referred to me by Dr. E. Hochheimer, of New York, January 5, 1888, with comparatively slight but persistent evidences of the disease. The pulse was 100, with slight swelling of the thyroid. There existed neurasthenia with extreme melancholy, and while there was hardly any exophthalmos there was present the somewhat rare symptom of obstinate œdema of the eyelids. The patient fully recovered after 40 applications of electricity extending over a period of three months.

Case 11.—Mrs. M., a widow, aged 31, consulted me January 9, 1888, with the following history. Five years before, her first child was born after a prolonged and unusually severe labor. She convalesced slowly, and in a few months, more or less, began to notice an undue activity of the heart, with shortness of breath whenever she ascended the stairs or walked more rapidly than usual. This symptom did not greatly increase until about two years ago, when the heart began to give her more trouble and she first noticed a "strange appearance about the eyes and a fullness in the neck." The eyes were now very prominent, the thyroid about as large as a small hen's egg, and the pulse beat from 128 to 135 per minute. She was markedly anæmic and extremely nervous. The patient was under treatment from January 9 to April 7 and then again from June 8 to July 29, receiving in all some 55 applications of electricity. Recovery has been approximate and permanent. The eyes are perhaps slightly more prominent than natural but not to a degree to excite comment. There are only traces of the enlarged thyroid, while the heart pulsates at a uniform frequency of between 80 and 90 per minute. Her general nervous condition also improved to such a degree that she now counts herself a well woman.

Case 12.—Mrs. E., aged 34, was seen with Dr. J. H. Gunning, of New York, April 21, 1888. Four years before she had miscarried and subsequently had worried much over domestic troubles. Three years before her heart began to trouble her, and soon after she observed a slight protrusion of the eyes and some enlargement of the thyroid. When Dr. Gunning and I first saw her the eyes were very prominent, but the gland was only slightly, though perceptibly, enlarged. The pulse, ranged in frequency from 115 to 135 and on one occasion we counted it at 165. The patient had lost much flesh; menstruation was irregular and profuse, and with a generally nervous condition was associated a very decided muscular tremor whenever she attempted to move the hands, simulating in marked degree the tremor of paralysis agitans. The patient was under treatment, with some intervals of rest, for seven months. During this time she received 73 applications of electricity and was discharged approximately cured. The pulse seldom rose above 100 and was usually at 85; the tremor had entirely disappeared, and the eyes were quite normal.

Case 13.—Miss S., aged 25, came to me August 6, 1890, through the kindness of Dr. W. P. Giddings, of Gardner, Me., well developed evidences of Graves disease. The eyes were slightly, though distinctly, protuberant. The thyroid gland was enlarged to the size, perhaps, of a very large almond, while the pulse beat at the uniform rate of 120, running up, however, on slight exertion, much higher. All exercise was exhausting, and ascending the stairs especially so. That the disease was not of recent origin was evidenced by the history given. As far back as 1885, while a pupil at Wellesley College, the act of recitation would cause her hands to tremble and perspire and her heart to beat tumultuously. When the cause of excitement was over, the heart would resume its normal action, but she noted, as time went on, that this instability of the heart-beat became more frequent and prolonged until finally it "went wrong," always, as she expressed it. It should be stated that the patient was somewhat anæmic and since the age of 14 has suffered from myopia and astigmatism. In 1887 and then again in 1889 she had slight attacks of the grippe which occasioned a decided increase in the severity of her symptoms. The symptoms, however, that were most distressing, if not the most serious, were the frequent and terrific headaches from which she suffered. These were associated with intense nausea, lasting some twenty-four hours, and recurring almost every week. The patient was first

treated through a period of seven months to March, 1891, receiving some 37 applications of electricity—improving gradually in every symptom. In July treatment was again resumed and continued until she had received some 25 additional applications. To this date the patient who is under constant observation retains all the benefit that she at first received. The pulse is 80 to 90. The eyes normal and the thyroid enlargement gone. More perhaps than all else she has been so relieved of the distressing headaches and nausea that it is only at long intervals that they occur and with very much mitigated severity.

Case 14.—Mrs. J., aged 34, was referred to me by Dr. George W. Harrison, of New York. She was in an extremely nervous condition, with a very decided enlargement of the thyroid—a pulse of 120—but no exophthalmos. She first observed some disturbance of the heart's action three years before, and a few months thereafter she detected evidences of a swelling in the throat. This patient was treated every day for two weeks, when she was obliged to leave town, but in that brief period, contrary to my expectation, all the symptoms were very decidedly alleviated. After a thorough and prolonged seance of galvanization of the sympathetic, central galvanization and general faradization, the pulse invariably subsided some 15 or 20 beats, only to rise somewhat during the next few hours. It was every day noticeable, however, that the pulse beat with less violence and frequency, and when she left town it rarely rose above 100.

The method of treatment adopted by me was carried out by her family physician, Dr. J. W. McLaughton, of Austin, Tex., and according to a communication from the patient the pulse was finally reduced to 80 and 85.

PHILOSOPHY OF THERAPEUTICS.

By L. B. ANDERSON, M. D., Norfolk, Va.

DEFINITION.

Therapeutics is the grand objective point of all medical study and investigation. The philosophical and scientific application of remedial agencies to the relief of suffering humanity involves a comprehensive view of the physical and mental constitution of the patient, as well as an accurate acquaintance with the vital functions, their relationship to each other, and the indications of their aberration from a legitimate and normal condition. On this foundation must rest, and from it must spring, every indication for the use of remedial agents, whether for the restoration of impaired functions or the removal of organic derangement.

IMPORTANCE AND DIFFICULTIES.

(1) As "life," in the language of Bichat, "is the totality of those functions which resist death," so health is an expression of the harmony and unity of all the vital manifestations. Disease, therefore, is but a suspension or aberration of one or more of those functions. Therapeutics must, consequently, deal with the restoration and rectification of such suspensions and aberration. The application of a sound scientific therapia requires observation the most minute and accurate, and a judgment the most profound and discriminating. The phases of functional derangement are often so obscure as to require the most patient investigation, and even then it is difficult to determine whether the trouble is local or reflex, specific or sympathetic. Hence, when remedies are claimed as effective in a certain group of symptoms, it is often uncertain whether their action has been exerted directly on the organ ostensibly deranged, or reflectively through some other organ or organs. This constitutes one of the great difficulties in determining the therapeutic value of any remedy, the *modus operandi* of which has not been definitely determined. It is not, therefore, surprising that many agents which are vaunted as endowed with remarkable curative powers are soon discarded by the observing and discriminating as comparatively worthless.

(2) Another difficulty, which confronts the therapeutist, is the want of reliability in the agents which are prepared for his use. It is evident that every medicinal

preparation should express the exact physiological effect of the agent it purports to represent, otherwise no certain and uniform results can be secured, no matter how accurate the diagnosis or scientific the prescription. Very many medicinal agents in the vegetable kingdom are of inestimable value when used in the green state, which are either useless or injurious in a dry state. Many again are mild, efficient, and reliable when used in infusion or tincture, which become harsh, acrid, nauseous, and highly objectionable when used in powder. This is, no doubt, one cause of the great discrepancy between the statements of medical men in regard to the *modus operandi* of certain agents.

(3) Another difficulty with which the therapeutist has to contend is the contrariety of opinions and teachings among medical authors, in regard to the physiological effect upon certain organs or tissues of a given agent. Thus, no doubt, some old author, from the internal use of the powdered root of sanguinaria, which is acrid and plastic, and hence very difficult of expulsion from the villous coat of the stomach, inferred that it was "an acrid, narcotic emetic." For many years every author of works on therapeutics has repeated this declaration *verbatim et literatim*, until within the past year a new candidate for popular favor has improved upon the old authors by declaring that it "may cause hypercatharsis and act as an irritant, acronarcotic poison." For forty years the writer has been using sanguinaria in tincture and sirup in all conceivable rational doses, in the weak and strong, old and young, in catarrh, laryngitis, bronchitis, diphtheria, croup, pneumonia, etc., often pushing it in very young infants to active emesis, and he has yet to observe a case of catharsis, prostration, or narcotism, or any condition approaching either following its use. The assertions of these authors are a delusion and a snare, and are calculated to bring into disrepute one of the most valuable articles of the materia medica, when properly prepared from carefully selected and preserved root.

Again, we are told by Ringer, Stillé and Maisch, Bennet, and others that "calomel is not a cholagogue, but diminishes the secretion of bile." Nothing could demonstrate the unreliability of so-called "high authorities" better than this declaration, to the practitioner who has for forty years practiced medicine amid the prevalence of all kinds of biliary derangements, and has tested all known drugs in torpor of the liver, suspended secretion, infarction of the gall bladder with inspissated bile, and has found all unavailing until a full dose of calomel was used. From our own experience and observation in the use of calomel in torpid liver in thousands of cases, as well as often and over in our own person, we have no hesitation in affirming that it is the most certain, reliable, and efficient cholagogue in the materia medica.

Experiments on dogs and other lower animals are utterly unreliable and delusive as to the *modus operandi* of medicinal agents on the human species in a state of disease.

The contrariety of opinion in relation to the physiological action of these two important therapeutical agents, one in the vegetable and the other in the mineral kingdom, has been adduced as an illustration of some of the many difficulties which environ a student of medicine in reaching a reliable conclusion in regard to factors which constitute his armamentarium in this field of his work. It is apparent that no substantial progress can be made in therapia, until more reliable facts are secured, and more philosophical and logical processes are adopted in securing incontrovertible conclusions, in regard to the *modus operandi* of medicinal agents.

PHILOSOPHY.

One fact has been clearly demonstrated in the progress of medical science which constitutes a substantial basis for therapeutical progress, and that is, that certain agents exert a specific action on certain organs and tissues. This action must be clearly defined before any practical results can follow its application. Thus, no class of medicines exert a more pervasive and salutary effect on the animal economy

in a large class of diseases, than cathartics. But in the administration of agents which act primarily and specifically on the *prima via*, not only the reflex influence of the agent on the other organs must be judiciously weighed, but the condition of the lining membrane of the bowels must be carefully investigated, that in attempting to relieve overburdened organs in other localities we may not excite by harsh cathartics a more formidable trouble in the gastroenteric channel. The same may be said of all other classes of medicines. Fortunately for medical science there are numerous agents whose specific effects on certain organs are clearly defined—thus, there are agents which act directly upon the kidneys, whose physiological effects are diametrically opposite. One is mild, soothing and cooling; another is stimulating, heating and harsh. To decide which class is indicated, the pathological condition of the organ must be clearly defined. Pathology, therefore, is the basic principle of all reliable therapeutics. Knowing the pathological condition of a given organ, and its physiological and pathological relation with other organs, will suggest the nature of the remedy required for its relief. The diversion of the mind from the true pathological condition, in quest of the cause which produced it, and the treatment of disease from that standpoint, will be to substitute empiricism for philosophy, and hypothetical factors for clearly defined scientific indications.

What matters it if we find tubercles in the cervical, pulmonary, or mesenteric glands, if we know that such medicines as will arouse healthful action in the absorbents, elaborate healthy blood, promote rapid assimilation, and energize the excretory functions, will remove them, whether they arise from Koch's bacilli or defective nutrition? What matters it if fevers arise from cryptogamia, bacteria, zymosis, functional aberration, inflammation, or so-called malaria, if we know that so soon as all the organs are restored to a proper functional activity the fever disappears? The only answer to these questions is found in a comprehension of the true pathological condition of the organ or organs affected, and the *modus operandi* of the agents requisite to overcome it.

In demonstration of the correctness of this conclusion we will state that in olden times Dr. Baynham, of Virginia, before the introduction of vaccine virus, opened a hospital for the inoculation of persons with smallpox virus. From old men who were treated by him in their youth the writer learned that he gave them one or two purges, confined them to a bread and milk diet, and carefully examined into the condition of all their organs before he operated. Nor would he then, if he found an impaired function or diseased organ. Under such treatment his patients would scarcely be sick at all—having only a slight fever and malaise for a few days. We know also that certain persons are exposed from time to time to exanthematous diseases without ever succumbing to them. They often feel badly for a few days and then it passes off without fever or eruption. Why? So elastic and vigorous are the vital functions that the virus is eliminated from the blood as fast as it incubates and before there is sufficient accumulation to subvert the vital functions or greatly contaminate the blood.

Thus we see that when a person has been exposed to any specific virus, by preserving, if possible, all the organs, tissues, and functions in a healthy condition, we may greatly modify or arrest the disease. This has been demonstrated time and again in our professional experience.

The boldness with which men proclaim themselves allopaths, homœopaths, hydropaths, etc., is a demonstration of the brazen effrontery with which they can boast of their ignorance and stupidity. To assume, as a general principle to be observed in the use of remedial agents, that a remedy should be employed to remove a given disease, which will produce a disease or condition dissimilar or opposite to that disease; or that a medicine should be employed which would produce a like or similar disease in a healthy system, in order to cure the existing disease, is as unphilosophical as it is irrational and unscientific.

In either case the principles of physiology and pathology are ignored, and the

treatment based on a mere hypothetical empiricism. It measures the nature and extent of the disease, as well as the effect of the remedy, by the ostensible symptoms, and not the pathological state of the diseased organs and tissues or the *modus operandi* of the remedy on the organ or tissue. Than this, nothing can be more unsatisfactory, unreliable, or delusive, for like symptoms spring from many different causes and opposite pathological conditions.

Because a remedy in a given dose will produce a certain effect, it does not follow in reason or experience that in a smaller or larger dose it will remove a trouble similar to the one it has produced. Stimulating medicines, as a general rule, become sedatives when pushed to an extreme degree, not because their direct action in larger doses is at all different from their effect in smaller ones, but because the excessive stimulation overpowers the vital resistance and sedation follows as a necessary sequence of overaction. Thus, quinine and alcoholic beverages are used as, and denominated, *sedatives*, when their sedative action is by no means the inherent quality of the agents, but the result of the inability of the vital forces to resist their overpowering stimulation. Hence, to denominate them "sedatives" is as much a misnomer as to call bloodletting a stimulant because in some cases of congestion it frees the vaso-motor centers from oppression and liberates the oppressed circulation; hence the use of stimuli to produce sedation is unphilosophical and empirical.

While it is true that different effects are produced by similar agents when given in varying quantities, every therapeutic agent has some marked ostensible effect by which it is characterized and through which it is recognized. Thus, wholesome and nutritious food, when taken in quantities adapted to the state and condition of the digestive organs, produces a pleasant exhilaration and imparts energy and strength to the system. Let, however, the quantity be more than can be readily appropriated, a train of morbid developments arises, such as palpitation of the heart, pain in the head and sides, eructations, hiccough, heartburn, and many other troubles; yet no one would denominate any of these the legitimate effect of nutritious digestible food. Opium is properly an anodyne, but in small doses it fails to meet this requirement, and in large doses it becomes a narcotic. To effect the last object, however, it develops other effects which, however, are undesirable; such as suspending secretions, constipating the bowels, etc. If, therefore, we wish to arrive at the legitimate effect of a remedy we must adopt that dose which will produce the most decidedly sanative influence without disturbing the vital functions to any appreciable extent. This point having been gained, the remedy should be assigned to its appropriate class and used only to meet the indications designed to be filled by that class. A failure to observe this rational principle has, no doubt, brought discredit upon many valuable remedies.

An inspection of the journals of the day will disclose the fact that instead of arriving at the true physiological action of a new agent, we often are assured that it will cure many diseases whose pathological states are quite different, and for the relief of which medicines of very opposite effects are needed. Hence, it is used for the cure of diseases, for the relief of which its physiological action is not at all appropriate, some of which it may have cured by its secondary effects, owing at the time to certain accidental or adventitious influences, which now being absent, it will utterly fail to meet reasonable expectations. In the use of a new remedy we must reason from cause to effect, reaching a sound pathological basis from which arise the ostensible symptoms of morbid action, and from this standpoint read the indications for cure. Every new agent for popular favor appeals for acceptance and patronage to no higher standard than the *ipse dixit* of some so-called authority. The writer knows of no more striking illustration of this than is observed in the indiscriminate use of so-called antipyretics. Let us see.

As animal heat is the result of the operation of the vital laws whereby an equilibrium is maintained between the generating and eliminating processes, it is evident that the temperature of the human system must virtually remain the same,

unless some force intervenes to destroy this equilibrium. When from any cause the vital functions are suspended or perverted, the organic laws are suspended and the laws of chemical affinity come into play, and new and strange compounds are formed by the chemical union of the dissolved tissues and discordant fluids. Fermentation, combustion, the liberation of acids and alkalies, and the formation of salts, alkaloids and other products of putrefactive decay ensue, and heat is eliminated as from a seething mass of putrescent organic matter. And, often, when life is extinct, as is the case in yellow fever, heat continues to evolve for an hour or more, reaching a temperature of 110° F. From this consummation of perverted functions in disorganization and death, if we follow nature step by step into her secret workshop we can find the key to the source of fever heat. Hence, we conclude that local inflammation, abnormal congestions, impaired functions, suspended secretion, disintegrating tissues, forming alkaloids or other new and noxious combinations under a suspension of vital laws and the operation of chemical forces, mark well the various stages of aberration from health and the true source of fever heat. So soon as the counterpoise between the heat-producing and heat-eliminating forces is lost, and organic laws cease to operate, and chemical forces with their attendant febrile developments come into play, nature demands of the therapeutist a prompt interposition, not to combat the exalted temperature, for that is only an expression of perverted function, but to restore the secretions, eliminate the retained effete products of tissue metabolism, and reestablish the lost balance.

When any of the antipyretic products of the coal-oil family which now constitute the chief armamentarium of the therapeutist in this field are given, the first ostensible effect is to allay pain if any exists, or to produce a sense of quiescence and repose. The result is the nerves of sensation, both animal and organic, lose their impressibility, and the heart and arteries, responding no longer to the impression of the irritating agents elaborated by the progressive chemical changes, sink to a state of repose. Oxygenation of the blood and tissues is thereby diminished, and the evolution of heat from the chemical changes is sensibly lessened.

In none of these experiments are the secretions restored or the morbid accumulations removed from the circulation, nervous centers or vital organs; hence antipyretics exert no sanative influence in fevers. The correctness of this declaration is demonstrated by the fact that so soon as the agent producing these impressions is eliminated or has expended its force, the reaction brings into exercise, often with increased potency, the chemical forces, and the temperature rises to as high or higher degree than before its use. The use, therefore, of antipyretics, or that class of medicines which reduce the temperature in fever, without any apparent effect on the secretions or evacuations, is irrational, unscientific, and unphilosophical.

As health is an expression of the unity and harmony of all the vital functions and manifestations, so disease is but a suspension or perversion of one or more of these functions. To preserve the one and restore the other is, *a priori*, the great end of all sound therapeutical philosophy.

THE ADVANTAGES OF AMORPHOUS PHOSPHORUS OVER THE OFFICIAL FORM.

By E. Q. THORNTON, M. D.

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The investigations of Wegner, Bradley, Broadbent, Thompson, and others should leave little doubt as to the value of phosphorus as a stimulant to bone growth, and in the treatment of disorders due to exhaustion or wasting of the nervous tissues. The remedy, while undoubtedly possessing powers so potent for good, has the great disadvantage of not being entirely safe, as disorders of digestion, nephritis, and

fatty degeneration are not infrequently attributed to its administration. On account of these untoward effects many authors have wisely insisted upon the utmost precaution in its use. As is well known, the form of phosphorus exclusively employed in medicine is the vitreous variety, from which both of the official preparations are made. Both of these preparations are open to the objections named above, and on account of the readiness of phosphorus to undergo change when exposed to the air, the pills are necessarily made by a complicated process, which renders their extemporaneous manufacture difficult. As to phosphorated oil, the other official preparation, its taste is extremely nauseous, as may be inferred from its combination (phosphorus, ether, and oil).

It is on account of these disadvantages of the vitreous phosphorus that I am led to suggest the employment of the amorphous or red variety. The amorphous phosphorus is made by heating the vitreous variety to 250° C. in the absence of air, and possesses the following advantages over the official variety: It does not readily undergo change at ordinary temperature; is almost entirely without taste or odor; therefore it can readily be made into pills at a moment's notice, it is free from irritant or caustic effect; consequently it is far less liable to give rise to irritation or inflammation of the gastro-intestinal and genito-urinary tract; but its greatest advantage lies in the fact that it is nontoxic, and therefore far safer.

That it has the same physiological effect as ordinary phosphorus, seems to be proven beyond doubt by Kelly, who, while experimenting upon himself to determine if it was toxic, experienced the full physiological effects of vitreous phosphorus. The following brief extracts are made from Kelly's essay, which has never been published:

Experiment No. 1.—For the first three days $\frac{1}{100}$ grain amorphous phosphorus was taken every 2 hours, 9 doses being taken each day. On the fourth day each dose was increased to $\frac{2}{100}$ grain, and from the tenth until the twenty-fifth day $\frac{3}{100}$ grain every 2 hours, 9 doses a day being taken.

Effect: Mental excitement, headache, vertigo, priapism, nocturnal emissions of semen, followed about the twentieth day by nervous exhaustion. Return to his normal healthy condition in about two weeks after discontinuing the drug.

Experiment No. 2.—About two weeks after completing experiment No. 1, he again begun taking amorphous phosphorus in doses of $\frac{1}{1000}$ grain, increased on the fifth day to $\frac{8}{1000}$, and on the tenth day to $\frac{1}{100}$ grain, 9 doses being taken each day. Priapism and nocturnal seminal emissions were among the most pronounced effects. The drug was discontinued on the seventeenth day, and he soon returned to his normal condition.

Experiment No. 3.—About six weeks after completing experiment No. 2, he took at a single dose 20 grains of amorphous phosphorus. The physiological effects came on promptly. Priapism, vertigo, nausea, followed by muscular tremors, cold clammy skin, great exhaustion, and seminal emissions while asleep were the most pronounced effects. For some weeks he was in a state of nervous exhaustion, from which he gradually returned to his normal condition. He is now in good health and shows no ill effect of this rather vigorous medication.

Reese publishes a case in which 30 grains of amorphous phosphorus were taken by a young woman, with suicidal intent, no toxic symptoms having been manifested.

My own experiments upon animals are in accord with those who assert that the substance in large quantities is not toxic. My investigations as to the effect of long-continued doses are as yet incomplete.

These records would seem to indicate that amorphous phosphorus, while having the same physiological action of the vitreous variety, is to be preferred as it is much easier to administer, less irritating, and above all is a far safer remedy.

SOME VIEWS REGARDING THE PHILOSOPHY OF DRUG ACTION.

By J. W. McLAUGHLIN, M. D., of Austin, Tex.

I have been impressed for some time with the belief that the progress of medica-science has been seriously handicapped by retaining certain indefinite terms; such for example, as vital force and vital action in the sense that they imply the existence of a unique and mysterious force which is not correlated to other forms of physical energy. Therapeutics has not entirely escaped this error. While our text, books and medical writers, as a rule, are silent regarding the cause of drug dynamics; there is a widespread belief that the energy of a drug is a form of force that is inherent in the drug itself and is not correlated to other forms of physical energy.

Our homeopathic neighbors are less reticent than ourselves regarding the cause of drug potency. In fact, one of the cardinal principles of the Organon is that the dynamics of a drug results from a spirit inherent in the drug itself, and that succussion and trituration of this only serves to separate the spirit from the gross matters of the drug, and thereby enables it to better act upon the spirit-like, vital force of man's body.

It seems to me, in the light of physical science, that the medical profession must accept either a physical or a spiritual explanation of drug dynamics. If we accept the spiritual we aline ourselves with the Hahnemanians and, I believe, place our explanation outside of scientific acceptance. If, on the other hand, we ascribe this energy to physical force, are we justified in asserting that it is an unknown, mysterious form of force? I think not, nor do I believe this is necessary.

The purpose of this paper is to outline my reasons for believing that the principles of motion in matter and those of chemistry are quite sufficient to account for drug dynamics, and when these are supplemented by the principles of biology, and legitimate deductions from them, they will indicate the nature of the therapeutic action of drugs as intelligently and far more scientifically than is done by assuming the existence in drugs, and in man as well, of an unknown, mysterious force.

I do not, however, offer this scheme as an elaborated theory of drug action; this would involve an explanation of both the dynamics of the drug and of the organism upon which it acts, an impossibility in the present knowledge of molecular physics. It is my purpose rather to outline, or suggest, an hypothesis which may eventually, when a knowledge of the factors involved becomes more accurate, be worked into a demonstrable theory of therapeutic action.

A perfected theory of drug action will then involve a scientific explanation of the dynamic energy of drugs and how this energy effects the organism in the cure of morbid action. I will pursue this line of inquiry as far as accepted principles of science will allow, and will then continue the investigation on these lines as far as legitimate deductions from these principles will justify; even then many of the details of therapeusis will have to await further light before they can receive scientific treatment.

Scientists, almost universally, believe in the discontinuous or corpuscular condition of matter. The usual form of this belief is that all material substances, whether solid, liquid, or gaseous, are composed of molecules, and these molecules of atoms.

We understand a molecule to be the smallest part of a substance in which its properties inhere. An atom is understood to be the smallest conceivable part of matter which is capable of going in and out of chemical combination. Now, as atoms are thought to exist only in combination, or couples of the same kind, which are termed molecules, especially by physicists, they must not be confounded with those molecules which are composed of atoms of dissimilar nature. Molecules in the latter sense vary in size and complexity. For example, a molecule of water is quite simple, being comprised of but few atoms, while an albumin molecule contains a great many atoms, and is massive and quite complex in its structure. An atom

is regarded from a chemical standpoint as a chemical unit, while from the standpoint of the physicist the molecule or atomic couple is the physical unit.

The physical units, or molecules, are believed to have figure, polarity, elasticity, and persistent and regulated motions of two kinds, interior and translatory. The interior motions, or those which take place within the molecules, occur in periods of time that are persistent, and are distinctive of the class to which the molecule in question belongs. As my hypothesis of drug action will rest upon the correctness of the theory that molecules vibrate in definite, unvarying, and distinctive periods, I will be pardoned for introducing the views of others upon this subject. Prof. J. Clark Maxwell, whose authority and distinguished ability in physical science will not be questioned, says:

Molecules exist of various kinds, having their various periods of vibration, either identical or so nearly identical that our spectroscopes can not distinguish them. The same kind of molecules, say that of hydrogen, has the same set of periods of vibration, whether we procure the hydrogen from water, from coal, or from meteoric iron.

Henry Hobart Bates, A. M., in an address to the Philosophical Society of Washington, in 1883, says, regarding molecules and their activities:

But could the molecule even be magnified to visible and tangible dimensions, with a new light to view it by, it could not by any means be rendered visible, in whole or in its parts, on account of its incessant and marvelous activity, both interior and translatory. That the molecule did not get its interior motion from the heat of dissociation is certain, for, in being allowed to recombine, it yields up its translatory activity, and with it as many degrees of temperature as disappeared in accomplishing the dissociation. No means of wholly destroying the interior motion are known. By some savants it is regarded as primordial and ultimate. It is highly probable, for reasons which Mr. Taylor has pointed out,[1] that the hydrogen-molecule contains at least four pairs of revolving elements, revolving in different periods, and in contractile orbits, but with periods as undeviating as those of the moons of Mars. It is in the revolving or vibratory constituent of this couple that we seek the final essence of matter, though perhaps not to arrive at it.

We must not endow it with gratuitous attributes, but it is surely an entity of some kind, having, in the first place, persistent and regulated motion. Secondly, it has inertia, or mass—the property of conserving *vis viva*. Thirdly, it has some bond with its fellow by which the motions of both are modified by a constant stress according to a definite law of distance, and this, following Newton, we call attraction. Fourthly, it has the complex property of interchange of momenta, accompanied by that of conserving and compounding motion by angular rebound upon an indefinitely near approach, which we name resilliance, or repulsion. Dimension it need not have, or any other property of masses; but nobody has ever yet succeeded in getting rid of the above four.

But if the world were made of atoms and molecules alone we could never know of their existence. It is necessary to have an elastic and highly attenuated medium, permeating all space, to reproduce and transmit, as wave motions, atomic and molecular vibrations.

This medium we call the universal ether, luminiferous ether, or, simply, ether. It is believed to pervade all space and to reproduce the specific motions of all atoms and molecules; for example, the vibrations of an atom or a molecule are thus reproduced in the ether as wave motions having periods equal to those of the atom or molecule which caused them. When, now, we consider that all matter is composed of molecules, and these, perhaps, of other molecules, certainly of atoms, and that specific vibrations of these various and differently vibrating elements are reproduced in the ether as specific waves, it becomes apparent that a conflict between these must occur; coincident waves will be amplified, while noncoincident waves will be destroyed by this action.

It is well known that waves of water which coincide in crest and trough will be amplified thereby, but when the crests of one set correspond to the trough of another set of waves, they will destroy each other. Likewise, waves of light and sound will

[1] Annual address before the Philosophical Society of Washington, 1882, p. 24.

behave in like manner under like circumstances. Sir John Herschel, in speaking of the law of interference, to the operation of which the above phenomena are due, says: "This principle, regarded as a physical law, has hardly its equal for beauty, simplicity, and extent of application in the whole circle of science." When we then consider, in the light of the principles of science above referred to, the conflict between the ether waves produced by the atomic constituents of a molecule, say, of a drug, it will be seen that some of the waves will be amplified, others diminished or destroyed, and all, perhaps, changed.

The wave motions of a molecule are then quite different from those produced by its elementary constituents, they have different periods, and represent an adjustment of the wave conflict of its atomic elements. Now it is the ether waves of the molecule which have resulted from an adjustment of its atomic waves, that, I believe, give the molecule its dynamic energy, and as the molecule is the smallest conceivable part of matter, say, of a drug, in which its properties inhere, the dynamic energy of the drug must be the sum of that of its molecules; i. e., the successive impact of its ether waves, recurring millions of times in a second, give the drug its dynamic energy.

The forms of specific energy which different drugs have, will, according to this scheme, result from differences in their molecular make-up. But the dynamic energy of a drug is quite a different thing from its therapeutic energy; the first bears a certain relationship to the drug itself, and is a constant quantity in normal conditions of the drug, while the second depends upon an additional factor, the organism in which the drug acts, and is, therefore, not a constant quantity; a drug is often harmful to one kind of animal and harmless to another. As the eye, the ear, and the nerves of the body are sensitive only to certain influences; for example, the eye to waves of light, and the ear to waves of sound, it is believed that the sensitiveness of animals to drugs is likewise the result of a definite relationship between the molecular ether waves of the drug and those of certain tissue elements of the body, and when this does not exist the animal is immune from the drug in question.

A rational theory of therapeutics, that would enable one to say how and why drugs relieve morbid action, can not, of course, be constructed on ether-wave interactions between the drug and tissue elements of the body concerned until we know in what period these waves recur; yet there are physical and physiological facts and certain pertinent analogies that lend probability at least to this hypothesis of therapeutic action. The most apparent of these are as follows, viz: (1) The tissue elements of the body offer no exception to the law of discontinuous or corpuscular nature of matter, or that the molecules and atoms of these vibrate in definite and distinctive periods. (2) Organic molecules, such as compose living organisms, and especially the albuminoid molecules, which comprise the principal bulk of man's body, are exceedingly complex in molecular structure, being composed of other and simpler molecules in innumerable number. These albuminoid molecules of the body exist in many isomeric forms (that is, contain the same chemical elements and in the same proportion, but differ as to the manner these are grouped in the molecules), and have lines of weak union, like the lines of cleavage in crystals, along which they are easily broken.

Now, as the ether waves of a substance are determined more by the grouping within its molecules rather than by its chemical elements, may not the facts above related serve to explain, first, the specific action of drugs, and, second, that immunity from these which an habitué of a drug is known to acquire? The first supposition is borne out by the difference of molecular structure of the various isomeric forms of albuminoid molecules and structural differences in the molecules comprising the other tissue elements when these are considered in connection with the susceptibility of the molecules to the dynamic energy of drugs which these differences produce; the specific action of a drug upon a group of like molecules would then depend on their molecular structure and the wave periods resulting from this.

What happens to the albuminoid molecules by the wave impacts of the drug will depend on whether the waves of the two—drug and albuminoid—coincide in crest and trough. If they do, the albuminoid would most probably be disrupted, especially if its habitat is in the fluids of the body. But albuminoid molecules of the solids of the body are more firmly united to their fellows, and, therefore, might not be disrupted by the dynamic energy of the drug. More likely, the ether waves of the drug would find vulnerable points along some of the lines of weak union of the molecules, and, attacking these, would simply change the molecular structure of the albuminoids, and would, thereby, give them that immunity from the drug which follows its constant use. If, on the other hand, the waves of the drug, and those of the albuminoid molecules, do not coincide in crest and trough, then the tendency of the first would be to antagonize or destroy those of the second.

The analogies which I shall offer in support of this hypothesis of therapeutic action are derived from the principles of heat, light, electricity, and sound. There are but few principles of science, whose truth rest upon accurate demonstration, and are more firmly established in the opinions of scientific men than is the belief that these forces of nature—light, heat, electricity, and sound—are essentially wave motions. And as these forces are known to have wondrous energy, and to be capable of producing changes of a pathological and curative nature in the living organism, is it not probable, at least, that other waves, say, those of a drug, may also exert an influence, and that the potency of the drug rests in the susceptibility of tissue elements to the dynamics of the drug?

The therapeutic power of these agencies, and their various methods of application, are so well known that it is deemed unnecessary to recount them here. Sound is, perhaps, the least potent in its therapy than the others. Yet the effect of sound waves over the emotions and passions is certainly very great. For illustration, martial music inflames man's military ardor, sacred music excites his religious emotions, while the soporific effect of monotonous musical tones is well known. For illustration, the pattering of rain drops, the sound of a distant waterfall, and the nurse's lullaby.

Now, with the lights before us, we must refer the distinctive energy of the forces named to peculiarities of their wave periods, and it is therefore not unscientific, in view of the facts recounted, to also refer the distinctive energy of a drug to peculiarities of its wave periods.

SUMMARY.

The principle features of this hypothesis may be summarized as follows, viz: The dynamic energy of a drug is derived from its molecular ether waves, and these are the sum of those produced by the vibration of its atomic constituents, plus their adjustment by interference.

The specific energy of a drug is derived from the specific character of its molecular waves; and the specific character of the waves are determined by (1) the chemical elements of the drug molecule, and (2) the order in which the atoms and elementary molecules are grouped in this.

The therapeutic energy of a drug is determined by the susceptibility of organic molecules of the organism acted on, to the specific energy of the drug.

The degree of susceptibility of an organic molecule to the specific energy of a drug is in direct ratio to the coincidence of their wave periods.

The degree of immunity of an organic molecule from the specific energy of a drug is in an inverse ratio to the coincidence of their wave periods.

Coincidence in crest and trough of the molecular waves of the drug and those of susceptible organic molecules will tend to disrupt the latter. Noncoincidence of these waves will tend to inhibit or disarm those of the organic molecule by weakening or destroying its wave motions. In either case the organic molecule will have acquired immunity from the drug.

These views are either based on the following accepted principles of science, or

on legitimate deductions from them. They are as follows: (1) The discontinuous or corpuscular condition of matter. (2) All matter, whether gaseous, liquid, or solid, is composed of molecules, and these molecules of atoms or elementary molecules. (3) Atoms vibrate in periods that are persistent and regular; that is, the vibrations are distinctive of each kind of atom. (4) The principles of wave motion; and (5) The isomeric forms of albuminoid molecules and their unstable and complex character.

The hypothesis is also strongly supported by the conviction that the therapeutic value of light, heat, electricity, and sound must be referred to peculiarities in their wave periods, as that of drugs is to peculiarities of their wave periods.

NOTE.—Since writing this paper, my friend, Dr. T. J. Tyner, of Austin, Tex., has related some remarkable results, obtained from hypodermic injections of pilocarpine in opacities of the vitreous humor, that seem to strongly confirm my proposition, that the dynamic energy of drugs tends to disrupt those albuminoid molecules of the fluids of the body having periods which coincide with the drug. The doctor says that he has completely cured many cases of opacity of the vitreous—some of several years' standing—by the hypodermic administration of pilocarpine; and as the vitreous humor does not contain blood vessels, nerves, nor lymphatics, except in the prenatal state, it becomes interesting to know how the drug effects the cure. In the absence of lymphatics, it can hardly be claimed that the opaque material is absorbed, and, in the absence of nerves, can the cure be brought about through nerve action. May it not be caused by the dynamic energy of the drug—its molecular waves—disrupting the opaque molecules of the vitreous? This scheme would require that the molecular waves of the drug and the opaque molecules coincide in periods and in crest and trough. Assuming this to exist, then the drug molecules when brought in contact with the opaque molecules of the vitreous, by means of the lymph spaces, would disrupt these by its wave impacts.

ACTION PHYSIOLOGIQUE DE QUELQUES PLANTES BRÉSILIENNES DE LA FAMILLE DES MÉNISPERMACÉES.

Dr. J. B. de LACERDA, Rio de Janeiro, Brésil.

La famille des Ménispermacées compte au Brésil un certain nombre de plantes médicinales, employées empiriquement par des gens du peuple.

Nous avons cherché étudier ces plantes sous le point de vue de l'action physiologique, et nous avons constaté que parmi elles il y en a quelques unes qui sont assez toxiques; tels sont l'icú (*Anomospermum grandifolium*, Eichl.), qui n'est pas autre chose que le *Cocculus Amazonum*, Mart., une des plantes actives du curare des Indiens Ticunas; l'abutua major (*Bothriopsis platiphylla*, Saint-Hil.); l'abutua minor (*Cocculus philipendulum*).

De ces trois ménispermacées la plus toxique est l'icú. Ceci est une plante des forêts vierges des Amazones, et nous l'avons fait apporter de Tabatinga, aux limites du Pérou. C'est une liane à feuilles assez larges; c'est avec l'écorce de la tige que nous avons préparé des extraits pour en expérimenter l'action sur les animaux. Quinze à vingt gouttes de l'extrait fluide de l'icú, injectées sous la peau des cobayes, les a fait mourir dans un quart d'heure.

C'est un poison vasculaire; il annulle la tension artérielle d'une façon brusque lorsqu'on fait l'injection intraveineuse; il paraît agir en paralysant les centres vasomoteurs de la moelle.

Quoique moins actives, les autres ménispermacées ci-dessus énumérées agissent de la même manière.

Il y a des rapports à établir entre l'action physiologique de ces plantes et celle de la péreirine, un principe résineux, amorphe, fourni par une apocynacée, nommé vulgairement Pau-Pereira (*Geissospermum Vellosum*).

Cette apocynacée et son principe résineux, la péreirine, sont, depuis longtemps, employés au Brésil comme fébrifuges.

UNE PLANTE CONVULSIVANTE DU BRÉSIL.

Dr. J. B. de LACERDA, Rio de Janeiro, Brésil.

Dans l'État du Pará il croît aux alentours des cabanes des Indiens une plante nommée parmi les indigènes Conamby. C'est un arbrisseau de la famille des Synanthérées, très employé par les Indiens pour pêcher les poissons dans les rivières. Ils en jettent des tiges coupées en morceaux et des feuilles dans l'eau; au bout de quelque temps les poissons étourdis montent à la surface de l'eau, où ils sont attrapés.

Ce fut le Dr. Clément Jobert le premier qui a fait des essais pour constater les effets toxiques du conamby.

Au retour de son voyage aux Amazones il m'a fait le plaisir de communiquer qu'il avait trouvé dans le conamby un poison convulsivant formidable.

Comme il avait expérimenté dans des conditions mauvaises, nous avons repris ces expériences dans le laboratoire du Musée National, et nous avons réellement constaté l'action toxique convulsivante du conamby.

Toutefois, il faut bien entendre, quoique un convulsivant, il n'est pas du tout un tétanisant tel qu'il est la strychnine, la brucine, l'igarurine.

Son action ressemble beaucoup à celle de la picrotoxine, le principe actif de la coque du Levant. L'extrait alcoolique délayé dans l'eau et injecté en quantité dans les veines d'un chien provoque une attaque de convulsions cloniques, précédée d'un cri aigu, avec augmentation de la salive, ralentissement excessif du cœur et projection des yeux hors les orbites. Ces attaques se répètent par crises, et quand elles sont finies l'animal reste anéanti, abruti.

Seulement l'extrait préparé avec des feuilles en état frais est capable de donner ces effets. Cela me fait croire que la substance toxique existant dans les feuilles est volatile.

La forme d'empoisonnement provoqué par l'extrait du conamby dit bien que cette plante mérite être classée parmi les poisons du bulbe.

CONTRIBUCIÓN A LA TERAPÉUTICA DE LA FIEBRE AMARILLA. NOTICIA DE LAS ESPERIENCIAS PRACTICADAS EN LA CÁMARA POLAR POR ORDEN DEL GOBIERNO GENERAL DE CUBA.

Por el Dr. PEDRO PEÑUELAS,

Inspector Medico, Jefe de Sanidad Militar de la Isla de Cuba.

Dada la importancia que tiene la fiebre amarilla para los paises americanos, es de suponer que este enfermedad adquiera preferente estudio por parte del Congreso Pan-Americano. En tal concepto he creido oportuno dar cuenta de la información preliminar rendida por la comisión nombrada por el gobernador general de esta isla, en el estudio que está haciendo de la cámara polar del Dr. García.

El cuerpo de sanidad militar de Cuba ha tomado parte siempre en los trabajos dedicados al estudio de la fiebre amarilla, ensayando cuantos tratamientos se han propuesto en el orden científico, y las autoridades de este país han patrocinado en todo tiempo estos ensayos. Nuestras estadísticas han ido disminuyendo en las cifras de mortalidad. (Estracto de las actas de la comisión.)

Primera sesión.—Se constituye la comisión y el Dr. García expone á la ligera el fundamento de la teoría que le sugirió la idea de emplear el aparato llamado cámara polar; siendo replicado por el Dr. Belver. El Dr. García presenta una estadística de los enfermos tratados por su procedimiento. Plano de la cámara que propone el autor.

Segunda sesión.—El vocal químico, Dr. Gaston Alonso Cuadrado, da cuenta de los aparatos de experimentación necesarios para hacer los ensayos químico-biológicos.

Tercera sesión.—Se acuerda suspender los trabajos por haberse ausentado el Dr. García de la población.

Cuarta sesión.—Se ordena por la superioridad que se dé informe de las esperiencias practicadas por la comisión, y está acorde que solo puede darse un informe preliminar.

Quinta sesión.—El vocal ponente, Dr. Felix Estrada y Catoyra, lee el informe preliminar, expone las esperiencias que confirman que el frio puede detener la vida de los microorganismos, pero no los destruye, citando á Pasteur, Tédenat y otros. Hace la historia de las aplicaciones terapéuticas del frio en la fiebre amarilla. Masnata y Fiaschieri en 1861 rodeaban de hielo las salas de los enfermos. Bavlot en 1878 propuso una especie de tienda de lona aplicando el aire frio, seco y oxigenado con electrización de la mezcla gaseosa. Despues de este año el Dr. Roure y el Dr. Hernandez Bucho idearon unas habitaciones refrigeradoras. Gamgee, de Londres, indica las aplicaciones del frio en la desinfección de los buques epidemiados, empleándose el sistema en Nueva Orleans. Los Ingleses usaron los "*ice bags*" en su escuadra de Jamaica. Los Drs. Bango y Espala aplicaron vestidos semejantes en 1883. La cámara polar difiere algo de estos procedimientos, por más que el medio terapéutico sea el hielo para refrescar la atmósfera que rodea al enfermo.

Exposición de las historias clínicas de los nueve enfermos que fueron asistidos por la comisión.—Juicio que merece al vocal ponente el tratamiento, por ahora no se puede decir nada definitivamente, se ve modificar el estado general de los enfermos, cree que hay una acción inhibidora del bulbo raquideo, estima que el descanso de las vias digestivas favorece algo, así como la obscuridad en que permanecen los enfermos; y que puede en resumen considerarse á la cámara polar como un buen medio ó habitación higiénica para colocar á los atacados de la fiebre amarilla, pero que deben introducirse modificaciones en el aparato, presentando un plano que le fue facilitado á la comisión por un oficial de artillería.

En la última sesión el Dr. Belver combate la cámara polar, y cree no llena el objeto que el inventor se propone.

Organizado el servicio, y repartido el estudio de los trabajos, la comisión se propone este año dar un dictamen definitivo, teniendo vivos deseos que los resultados sean favorables, pues en interés de la medicina y de la humanidad está el resolver el problema de la terapéutica de la fiebre amarilla, para ver si podemos borrar el "lasciate ogni speranza" que parece se cierne sobre los paises donde esta enfermedad es endémica.

ALGUNAS APLICACIONES DE LA CREOSOTA DE HAYA.

Por el Dr. ENRIQUE E. LÓPEZ, Octolán, México.

He usado la creosota blanca de haya con buenos resultados en el uzagre y la tiña. Para el primero, solución acuosa al medio por ciento; y en la segunda, agua 150 gramos, creosota 1 gramo.

En la mentagra al 1 por ciento. En la psoriasis difusa, glicerina 30 gramos, creosota 1 gramo. En la disentería aguda de las inmediaciones de tierra caliente la fórmula ordinaria ha sido: Agua 500 gramos, creosota 2 gramos 50 centígramos, en cinco lavativas, una cada dos horas antecedidas de una grande emoliente. Bebidas emolientes al interior y dieta lactea.

OBSERVACIONES.

N. N., de 34 años de edad, temperamento nervioso, constitución mediana. El 21 de mayo de 1890 tuvo de catorce á diez y seis deposiciones disentéricas. Dia 22, tratamiento dicho, en la noche medio gramo más de creosota en 150 gramos de agua para dos enemas con intérvalos de seis horas. Dia 23, suspención de la creosota enemas emolientes. Dia 24 alta, ni recidiva ni recaida.

N. N., 19 años, temperamento sanguineo, constitución buena. Diagnóstico: Disentería aguda, como el anterior. Tratamiento citado. Dia 6, reduc- ción á la mitad de la fórmula, y á dobles intérvalos. Dia 7 alta, ninguna consecuencia.

N. N., de 34 años de edad, temperamento nervioso, constitución mediana, costumbres morigeradas de siete años atras, y antes masturbador tenaz, por cuyo motivo aún sufria poluciones nocturnas. Lo ví por primera vez el 22 de mayo de 1890, habia tenido el dia veintiuno, de catorce á diez y seis deposiciones y las nueve ó diez últimas algo abundantes pero con sangre. El dia de la primera visita vientre doloroso, pulso pequeño á 94 por minuto, temperatura á 37.8, lengua saburrosa, sed intensa y mucha repugnancia por los alimentos sólidos. Hasta las 11 de la mañana en que lo ví, once deposiciones características, desde las cinco de la misma. En el resto del dia solo hubo cuatro deposiciones sin cólico, pero con fuerte tenesmo. Le prescribí crema de leche á la margen del ano y medio gramo más de creosota en 150 gramos de agua para dos lavativas, una cada seis horas. Dia 23 á las 7 de la mañana, angustia epigástrica, mal sabor en la boca, cesó la sed, lengua húmeda y ménos sucia, poco dolorosa la palpación ventral, pulso á 80, temperatura 37.2 y desde el amanecer una sola deposición con muy poco tenesmo. Prescripción 0.75 gramo de creosota en 300 gramos de agua para cuatro enemas, una cada cuatro horas, y además agua albuminosa á pasto al interior. Dia 24 á la 1 de la tarde, desde al amanecer ninguna deposición, sensación de calor á lo largo del recto, todo lo demás normal. Prescripción: Lavativas emolientes, sopa ligera y pan tostado. Me despedí recomendando que se fueran aumentando los alimentos con moderación y el 31 de mayo abandonó la dieta en completa salud.

N. N., mujer de 19 años, temperamento sanguineo-nervioso y de constitución muy buena. Fue visitada el 5 de abril de 1890 á las 10 de la mañana; siete deposiciones características desde la media noche del 4, según conmemorativo, dos deyecciones por la tarde abundantes, semi-sólidas, con tenesmo y cólico, pulso el dia 5 á 102, temperatura á 38, piel madorosa, sensación de abatimiento, cara lánguida, lengua blanquecina, aliento fétido, sed, anorexia, vientre doloroso y mucho desasosiego. Prescripción: La anteriormente conocida, con todos sus detalles. Dia 6 á las 8½ de la mañana, desde la hora en que me retiré el dia anterior hasta aquella en que volví, nueve deposiciones pequeñas con poca sangre y mucha mucosidad, con tenesmo y sin cólicos, pulso á 84, temperatura á 37.3, mucho sueño, todo lo demás normal. Prescripción: Creosota 1 gramo 25 centígramos, agua 250 gramos para cuatro lavativas, una cada cuatro horas. Dia 7 á las 12½, ligera cefalalgia que atribuí á la dieta, y sensación de astricción en el ano. Prescripción: Lavativas emolientes y le permití aumentar la alimentación. El dia seguiente franca convalecencia.

O ACIDO CITRICO NA COQUELUCHE.

Por MONCORVO Filho,

Chefe de clinica encarregado do serviço bacteriologico da Clinica de Pediatria da Policlinca do Rio de Janeiro; Assistente do Laboratorio de Biologia; Membro effectivo do Gremio dos Internos dos Hospitaes; Actual bibliothecario do mesmo Gremio; Socio fundador da Sociedade Nacional de Acclimação, etc.

Estudando os agentes therapeuticos sobre o germen que me foi dado identificar como especifico da coqueluche, segundo os preceitos indicados por Bouchard, pude verificar factos bastante curiosos.

Assim organisei um quadro em que registei os diversos resultados correspondentes a cada agente ensaiado, actuando directamente sobre o germen, ou deixando com elle em contacto em culturas.

O acido borico, 10 por cento; o benzonaphtol, 5 por cento; o salicylato de sodio, 5 por cento; a creolina, ½ por cento; o permanganato de potassio, 5 por cento; o acido phenico, 5 por cento; a antipyrina, 10 por cento; e a quinina, 50 por cento; mostraram-se mais ou menos improficuos, como verifiquei, não só sobre o germen no campo da preparação, como nos tubos de cultura, onde as colonias caracteristicas se desenvolveram sem embargo, com maior ou menor pujança.

O sublimado corrosivo (1:10,000) deu bom resultado, porem não tem emprego practico por ser toxico.

A resorcina, cuja applicação topica constitue o tratamento pela primeira vez ensaiado e com o mais proficuo resultado adoptado por meu pae, o Dr. Moncorvo, desde 1882 contra a coqueluche mostrou-se-me ser, como era de esperar, poderoso agente destructivo do microbio.

Experimentando, por curiosidade, a influencia do acido citrico, substancia ainda não estudada com relação áquella affecção, e empregando-o em solução, aquosa na

proporção de 10 por cento, reconheci ser elle um excellente agente destruidor do microorganismo que serviu para minhas investigações. Essa acção destruidora tanto foi por mim observado no campo da preparação, como nas culturas, onde verifiquei a completa esterilisação do germen da coqueluche.

Animado, pois, pelos satisfactorios resultados de laboratorio propuz a meu pae, o Prof. Moncorvo, que ensaiasse em seus pequenos doentes no Serviço da Policlinica do Rio, o acido citrico no tratamento daquella affecção.

Trez casos serviram logo para a experimentação clinica, havendo parecido ser de grande efficacia aquelle agente therapeutico.[1]

O primeiro caso refere-se a um menino de dous annos e meio, preto e que entrou no serviço a 15 de fevereiro de 1892, para tratarse de uma affecção syphilitica; de 8 de abril a 7 de junho do mesmo anno, symptomas de malaria aguda, que foram jugulados pela quinina. A 22 do mesmo mez tosse com os caractéres da coqueluche, que torna-se evidente em 2 de julho. A 5 deste mez começa se a medicação por meio de badigionnages periglotticas com uma solução citrica a 10 por cento. Dez dias depois o doente estava curado da coqueluche.

O segundo caso trata-se de uma creança de tres annos, parda que apresentou-se ao serviço, em 16 de julho de 1892, com uma coqueluche intensa, tanto pela frequencia como pela violencia das quintas, que acarretavam vomitos e interrompiam o somno da doente, sobrevindo em numero de mais de dez durante a noite. Em 18 de julho encetou-se o tratamento por meio das badigeonnages com a solução citrica (10 por cento) apresentando-se a doente no dia vinte e um quasi inteiramente curada. A coqueluche neste caso dactava de tres mezes.

O terceiro caso finalmente diz respeito a um menino de 4 annos, branco, que veio ao serviço em 8 de julho para ser tratado de uma coqueluche que, comquanto dactando de quinze dias, houvera ja attingido o periodo convulsivo, tornando-se ao mesmo tempo muito violenta. As quintas acompanhadas, frequentes vezes, de vomitos, repetiam-se mais de vinte vezes nas vinte e quatro horas. Phenomenos bronchiticos. Começo de placa diphtheroide. 9 de julho: Começou-se o tratamento pela applicação topica do acido citrico; a coqueluche e os demais phenomenos começaram logo a ceder rapidamente até que em 23 do mesmo mez, vestigio algum restava da coqueluche, sendo bom o estado geral da creança. Antes de encetar o tratamento pela solução citrica, e depois da cura, eu practiquei sempre em todos os casos o exame microscopico com excellente resultado.

Do que precede parece poder-se concluir:

(1) Que ainda uma vez a experimentação de laboratorio foi confirmada pela experimentação clinica.

(2) Que da acção germicida do acido citrico, pela primeira vez, por mim demonstrada sobre o germen da coqueluche, resultou o seu vantajoso emprego no tratamento dessa affecção, como se vê dos casos aqui relatados.

(3) Que se bem não seja sua acção tão poderosa como a da resorcina, offerece no entanto grande superioridade á muitos outros medicamentos preconisados no tratamento da coqueluche.

(4) Que se pode utilisal-o com proveito como meio prophylactico administrando-a limonada citrica concentrada ou o proprio limão, ás creanças que se acharem em contacto com as atacadas daquella molestia.

(5) Que nos lugares em que se não dispuzer da resorcina chimicamente pura, poderá esta ser, com vantagem, substituida pelo acido citrico em equivalente proporção.

[1] Resumos estrahidos das observações do Archivo do Prof. Moncorvo.

THE CLINICAL IMPORT OF KOUMISS.

By J. MOUNT BLEYER, M. D., of New York City.

From the results I have obtained I am thoroughly convinced that koumiss serves its most useful purpose in the condition I am pleased to term "tissue starvation," either in that slow form due to chronic disease or in the pernicious form resulting from acute affections.

From exhaustive clinical observation, both in private and hospital practice, I am thoroughly convinced that for general tissue nutritive value there is nothing so efficacious as koumiss.

We know that koumiss is a highly effervescent, slightly acidulous beverage, made from milk by a peculiar process of fermentation. It contains casein, the most nutritious element of milk, in a form in which it can be much more readily digested and assimilated than in the unfermented state.

The principal changes which milk undergoes, when converted into koumiss, are: The lactose is partly converted into lactic acid, carbonic acid, and alcohol; the albuminoids are partially peptonized, and the remaining ingredients separated into such a finely divided state that the digestive fluids can readily act on them. As the above changes are constantly going on in koumiss, we can readily see that it is not at all stable, and that its composition is constantly changing.

While in the first stage, when still somewhat sweet and only gently effervescent, it is called "milk koumiss," similar to koumiss made from koumissgen when freshly prepared. This in the course of a few days passes into the strong koumiss, decidedly acid and highly effervescent. While in the intermediate state it is called medium koumiss. All these conditions are under perfect control by the use of koumissgen.[1]

Koumiss when taken in large doses, should not be administered too cold. Except in cases of severe and uncontrollable vomiting, it should be given with the chill off, and will then be found very easy to digest. This point I want to impress on you, particularly when used in pulmonary phthisis, where the consumption of large quantities of koumiss is required, and where the nearer the temperature of the ingested fluid approaches that of the blood, the sooner and easier will it be absorbed and digested. A temperature of about 60° F. is found to be the best.

The next question is, in what quantities shall koumiss be taken? The first precaution to be observed is that the quantity should never exceed what the invalid's stomach can easily digest, and will also depend upon the disease for which koumiss has been prescribed. As a food, any quantity can be taken by a healthy individual.

For the last thirteen years I have given much attention to the administration of koumiss in the various forms of ailments specially here described.

I found that koumiss has given me a most excellent evidence of its power in 40 cases of diptheritic stenosis in children over 3 years of age in whom the operation of intubation had been performed.

All these patients bore this preparation much better than the ordinary bottle koumiss and other foods. It was found that in all such cases koumiss produced no specific action, but was simply the most digestible food that could be employed with the view of improving the quality of the blood and the nutrition of the body.

In the many operations which we are called upon to perform about the mouth, throat, etc., I know of no better food that serves to keep the body above par during the healing process than koumiss given *ad libitum*.

In two cases of cancer of the esophagus, the nutrition of the body was extremely low when the cases came into my hands for treatment, on account of a lack of nutri-

[1] Koumissgen is a powder resembling koumiss, but superior to it in most respects. It is in a dry form and possesses the advantages over other forms of being readily transportable, readily prepared for immediate use, and keeps in all climates. It is also less expensive than the bottle form and is much more palatable and digestible.

tious food. In these cases I intubed the esophagus and through the opening thus made kept up the nourishment of these patients by koumiss and a generous diet. Large quantities of koumiss were administered in this way. Their life, beyond doubt, was prolonged for eight months, besides relieving them from the agonies of starvation, which is the usual end in such cases. I will cite one more important case from my record book showing the importance of koumiss as a reconstructive.

A child two years old was suffering from a syphilitic tumor at the base of the epiglottis; the tumor involved the vault of the larynx, which necessitated a dangerous operation at that age. The operation of intubation was performed, and by means of the stomach pump I fed the child on koumiss for three months, until the action of the remedies employed for the treatment of this tumor resulted in diminishing its size. The child recovered without much loss of weight.

In five cases of syphilitic stenosis of the larynx, due to the formation of a web, where the operative procedure of cutting through the web was necessary, and a large-size intubation tube was wedged between the cut edges and worn for six to fifteen days until these edges healed, making swallowing difficult, both on account of the pain and large size of the foreign body in the vault of the larynx, feeding on koumissgen, by the use of the esophagal tube, was carried on for a number of days. At no time were there any symptoms of tissue starvation observable.

In several forms of laryngeal ulceration due to tubercular deposits in the last stages, painful swelling is always a most distressing symptom; in these individuals the symptoms of tissue starvation are very marked. Here I employ the same procedure, feeding them upon koumissgen through the tube, with remarkable results. In order to draw a comparative test, I allowed two cases to partake of whatever food they could swallow without the aid of the tube. The result of this experiment showed that those who could only eat with difficulty, as aforesaid, were losing ground very much faster than those fed regularly upon a sufficient amount of koumissgen through the esophagal tube.

Many other cases thus treated with koumissgen I could cite, and would advise you all to give this valuable food a thorough trial. I can highly recommend its use in all branches of medicine, as well as in my special cases.

In conclusion I would say that I have substituted koumiss, made from koumissgen (the new dry form of koumiss), in all cases where I formerly employed liquid koumiss, and find it much superior in many respects, both in regard to convenience of handling and in the results obtained. It is uniform in composition, and I find most patients will take it readily, which is not the case with liquid koumiss.

THE THERAPEUTIC USES OF PHENOCOLL, WITH SPECIAL REFERENCE TO ITS EMPLOYMENT IN MALARIA.

By DAVID CERNA, M. D., PH. D.,

Demonstrator of physiology and lecturer on the history of medicine in the medical department of the University of Texas; formerly demonstrator of and lecturer on experimental therapeutics in the University of Pennsylvania, etc.

I have already, with the collaboration of Dr. William S. Carter,[1] studied the physiological actions of this new product, phenocoll. The drug is closely related to phenacetine. It is obtained by the interaction of phenetidin (para-amido-phenotol) and glycocoll (amido-acetic acid). The *hydrochloride* or *hydrochlorate* of phenocoll, the salt most generally employed in practical medicine, occurs in the form of a white crystalline powder, soluble in water at a temperature of 62° F. (about 17° C.) in the proportion of one to sixteen parts. It is readily soluble in hot water and in alcohol,

[1] Notes on New Remedies, September, 1892.

its ready solubility being due, it is claimed, to the presence of the amide (NH_2) group. The drug is barely dissolved by benzole, chloroform, or ether. The water compound melts at 203° F. (92° C.); but the anhydrous base requires a temperature of 212.9° F. (100.5° C.). The salt, according to chemical analysis, may be represented by the following formula:

$$C_6H_4\begin{cases}OC_2H_5\\NH,\ COCH_2NH_2,\ HCL.\end{cases}$$

From a solution of the hydrochloride the alkalies and the alkaline carbonates precipitate the pure base.

According to Ott,[1] phenocoll causes in frogs first, a general paralysis, followed by loss of sensibility, and finally of motility, with diastolic arrest of the heart. Both sensation and motion are destroyed owing to an action of the drug upon the spinal cord. In rabbits it causes quietude, cyanosis of the ear, and weakness of the posterior extremities.

Carter and the writer[1] found from the results of their experimental work that phenocoll, in ordinary amounts, has no effect practically upon the circulation; that large doses diminish the blood pressure by influencing the heart; that it reduces the pulse primarily by stimulating the cardio-inhibitory centers, followed by an increase in rate due to paralysis of said centers; that the final diminution in cardiac beat is dependent on an action upon the heart. On the blood itself the agent exercises no influence. It was also observed that phenocoll causes, in septic fever, a very decided fall of the temperature, the fall occurring the first hour after the administration of the drug by the stomach. The reduction of the fever is the result of an enormous diminution of heat production, without any alteration of heat distribution. Finally, the power of phenocoll to reduce abnormal high temperatures is very decided, and it does this in therapeutic doses, without depressing the circulation.

Phenocoll hydrochloride has already been tried clinically with alleged success. It has been found useful as an antipyretic, and also in the treatment of neuralgia, influenza, and rheumatism. I need only refer to the favorable reports published already by various observers, among whom may be mentioned Hertel,[2] Jacob,[3] Herzog,[3] Cohnheim,[3] Albertoni,[3] Bradenburg,[3] and others. Quite recently Klick[4] has called attention to the value of phenocoll in measles, and Beck,[5] writing on the antiseptic properties of the drug, says that "it surpasses iodoform, because it dissolves easily, is odorless, does not produce eczema, is not contraindicated in kidney disease, and, on account of its nonpoisonous effects, it can be applied to very extended surfaces."

The excellency of phenocoll in malarial diseases, as first pointed out, I believe, by Albertoni, assisted by Novi, Prate, and Venturini, has been confirmed later by the observations of Crescimano,[6] Dall 'Olio,[7] Cucco,[8] and Cervello.[9]

Albertoni reported successful results with the use of phenocoll in 22 cases out of 29 of paludal disease. Cucco, according to his preliminary report, treated 84 cases of malaria with the same drug. Brilliant results were obtained in 52; in 21 the value of the medicament was uncertain, and in 4 cases it failed to do any good. The other 7 cases were not observed sufficiently long to give any accurate information.

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[1] The Modern Antipyretics, 1892.
[2] Deutsch. Med. Wochenschr., April 9, 1891.
[3] Notes on New Remedies, February, 1892.
[4] Notes on New Remedies, June, 1893.
[5] N. Y. Medical Journal, April 22, 1893.
[6] Berlin Correspon. in Notes on New Remedies, May, 1893.
[7] Gazet. degli Ospitali, January 14, 1893.
[8] Therap. Monatshefte, No. 4, 1893.
[9] Archiv. di Farmacol. e Terapeutica, 1893.

It may properly be said, perhaps, that in the whole and almost infinite range of therapeutic science, the nearest approach to specific treatment of disease is that of mercurials and iodides in the different forms of syphilis, and of quinine in the various types of malaria.

Almost from time immemorial quinine has been known to destroy marsh fevers, the drug acting in such cases evidently as a specific. The empirical knowledge of yesterday has been strengthened by the biological science of to-day. Indeed, it is now known that the alkaloid of cinchona acts, not only as an antipyretic, but that as an antiperiodic it exercises a direct influence on the plasmodia.

It will be remembered that as far back as 1765 Pringle called attention to the fact that cinchona bark, in powder or decoction, has the power to arrest or prevent putrefaction in flesh, a discovery which has been confirmed by the researches of Hallier[1] and other observers, and more especially by the studies of Binz.[2] Councilman has recently shown that quinine does act on the plasmodia of the paludal disorder; and again, Romanowsky[3] has observed the regressive changes in the malarial parasites, brought about by the administration of quinine. Laveran[4] had already stated that the efficacy of quinine in paludal fever depends upon a specific destructive action of the drug upon the hæmatozoa. But I shall not go any further into this matter, so interesting from a scientific point of view. I may be allowed to add, however, that there are typical cases of malaria which resist the action of quinine. In corroboration of this, Councilman found that neither quinine nor arsenic exercises any action whatever upon the crescentic organisms. This phenomenon has not been fully explained, although Wood[5] suggests that "it is indeed not altogether certain that these (the organisms) represent one of the life stages of the segmenting organisms and have etiological connections with malarial fever."

I fear I have digressed too much from my present theme. Returning, therefore, to the subject proper, I may state that my chief object in preparing this brief article is to record a few cases of malarial intoxication in which excellent results were obtained from the administration of the new agent under study. My short experience appears to corroborate in the main the observations of Albertoni, Crescimano, Dall 'Olio, Cucco, and Cervello.

In a recent visit to a malarial district I had opportunity to make a number of observations in the treatment of paludal fever with phenocoll. A few of these cases had already been treated with quinine and arsenic with little, if any, success; and it is worthy of note that in many of the cases that resisted the action of quinine and arsenic, the new remedy—phenocoll—gave excellent results.

With little or no time to make a minute microscopic examination of the blood of patients suffering from malarial symptoms I simply followed the method advised by Laveran.[6] The blood was obtained by puncturing a finger, thoroughly washed and cleansed properly previously, by means of a needle sterilized in the flame of a lamp. The blood appearing at the puncture was received upon a cover glass, and distributed in a thin layer by means of a second cover glass placed upon the first. The examination was made by daylight, during or soon after the malarial accesses. In this way the spherical bodies, and sometimes the flagella, could be observed. This is all that was done, which was found to be sufficient for the purpose of diagnosis and further observation. I may state, however, that I was not always successful in discovering the parasites.

All the patients under my care were advised to follow, as strictly as possible,

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[1] Das Cholera-Contagium, Leipsic, 1867.
[2] Virchow's Archiv., Bd. XLVI, p. 68, 1869.
[3] St. Petersb. Med. Wochenschr., August 24–31, 1891.
[4] La Médecine Moderne, February 19–26, 1891.
[5] Therapeutics: Its Principles and Practice, edit. of 1891.
[6] La Semaine Médicale, December, 1890.

hygienic measures; at the same time a liberal diet, such as milk, eggs, meats, farinaceous articles of food, broths, toast, etc., was, with a few exceptions, allowed. This latter concession was an agreeable surprise to the majority of my patients who, I was assured, had been starved to death almost under the care of previous physicians.

Permit, me, then, to describe the cases that follow:

Case I, quotidian type.—J. M. D., male, schoolboy, aged 15 years. On June 28, had diarrhea and vomiting, followed by intense fever. When first seen had already suffered six well marked accesses, characterized by cold extremities, chills, and elevation of the bodily temperature. No appetite; coated tongue; fetid diarrhetic stools to the number of four or five a day; tympanitis; both liver and spleen enlarged. Rectal temperature, 39.2° C. Blood showed germs.

July 4: Gave some calomel and subnitrate of bismuth to insure intestinal antisepsis, and then ordered 1 gram of the hydrochloride of phenocoll in water in 3 doses one hour apart.

July 5: Had only two stools in the day, not so fetid; all other symptoms less marked. Rectal temperature, 38.5° C. Tongue improved in appearance; no more vomiting. Ordered the same dose of phenocoll.

July 6: Passages almost normal, two in the day; no tympanitis; tongue much less coated; better appetite. Rectal temperature, 37.8° C. Still a few plasmodia in blood. Gave 1 gram more of phenocoll.

July 7: Symptoms of digestive tract much better; no vomiting; no diarrhea and no tympanitis; appetite greatly improved; tongue almost clean; no chills or cold extremities; had one passage. Rectal temperature, 37.2° C. Blood was not examined. One gram of phenocoll, as before, was ordered.

July 8: General condition very good; patient quite bright; all symptoms of digestive tract abated; size of liver and spleen much diminished; appetite very good; tongue quite clear; patient believes himself cured. No plasmodia in blood. Rectal temperature, 37.2° C. Ordered another dose of phenocoll.

July 9: Apparently no trace of the disease. Blood showed no parasites. Patient somewhat weak yet, but appetite almost voracious; liver and spleen practically of normal size; tongue perfectly clean. Rectal temperature, 37.1° C. Drug was suspended.

July 11: No return of fever accesses observed.

July 13: Patient had a slight feverish reaction, occurring at the usual hour. Thermometer marked at the rectum the figure 38.1° C. A few plasmodia observed in blood. Administered phenocoll during the fever, and in the course of an hour and a half the temperature was almost normal. Next day examined blood, but could see no parasites. Recovery was final. I saw patient July 18 and was then enjoying the best of health. He had taken in all 6 grams (90 grains) of the drug.

Case II, quotidian type.—M. V. N., female, 18 months old. Had been ill for about two weeks; liver somewhat enlarged, but spleen markedly so; frequent vomiting, but diarrhea slight; tympanitis marked; tongue quite coated; child extremely anæmic. Rectal temperature, 40.5° C. Blood was not examined. Access of fever occurred at night, preceded by cold extremities and followed by profuse sweating; loss of appetite.

July 1: Gave her subnitrate of bismuth and ordered 5 grains of phenocoll in water in divided doses.

July 2: Had five black stools, but the rectal temperature was only 38.7° C. Ordered calomel and another dose of phenocoll of 5 grains, to be administered in the same manner as the day before.

July 3: Infant somewhat better. Two stools, still diarrhetic; tongue improved; tympanitis much less marked; liver and spleen still enlarged, the latter apparently quite sensitive. Rectal temperature, 37.5° C.; sweated very little. Ordered a third dose of 3 grains of phenocoll.

July 4: Tympanitis almost gone; had one well-formed stool; tongue comparatively clean; hepatic area of dullness diminished; splenic dullness about the same; appetite better. Rectal temperature, 37.2° C.; no sweating. Suspended medicament.

July 5: Little patient continued to improve; no more fever; tympanitis and diarrhea have disappeared; tongue clean; appetite better. Child much brighter; size of liver apparently normal, that of spleen diminished.

July 6: Marked improvement; all bad symptoms have gone; spleen almost normal size now; child playful.

July 8: Fever has not returned, and the little patient appears to have completely recovered; digestive tract in good order; spleen apparently normal in size. Child had in all 13 grains of phenocoll.

Case III, tertian type.—M. F., male, farmer, 23 years of age. Had been ill a fortnight. When first seen was much emaciated; tongue coated; liver and spleen en-

larged, the latter extremely painful; vomiting and diarrhea persistent; tympanitis pronounced. Rectal temperature, 39.6° C. Fever accesses occurred at about 11 o'clock a. m., followed by profuse sweating. Chills were not marked. Examined blood and found plasmodia. Ordered salol and bismuth subnitrate. In nonfever day, July 2, ordered 2 grams (30 grains) of phenocoll in the course of the day.

July 3: Digestive symptoms improved; no vomiting, and only three stools during the day. Rectal temperature at the hour of expected access, 37.8° C., and one hour afterwards, 38.2° C. Blood still contained parasites. Ordered another dose of phenocoll of 2 grams on the following day.

July 5: No digestive disturbances; tympanitis slight; the tongue almost clean; had only two well-formed passages; appetite improved; hepatic and splenic areas of dullness much diminished; could find no plasmodia in blood. Rectal temperature, 37.5° C. Suspended drug.

July 7: Fever returned, with the appearance of parasites in blood. Ordered a third dose of 2 grams during well day, but somehow or other the attendants failed to give it.

July 9: Found patient in high fever, 39.1° C., at 12 o'clock m., with active diarrhea and frequent vomiting. Remonstrated for not having given the medicament, and ordered it to be administered without fail on next day.

July 11: All symptoms abated; liver and spleen very much diminished in size; tongue perfectly clean, and appetite voracious. Rectal temperature, 37.3° C. No plasmodia in blood. Ordered, however, a fourth dose, after which the patient entered into a frank convalescence and recovery was established. Patient received 8 grams (120 grains) of phenocoll in all.

Case IV, Tertian type.—J. D., male, school-teacher, aged 25 years. Disease of three weeks' standing. Patient had been under the use of quinine until full cinchonism had been produced, but without avail. Was first seen July 3, and was yet deaf from the effects of the cinchona alkaloid; tongue coated; colicky pains, but no vomiting or diarrhea; extreme emaciation; severe headache and backache; liver of normal size, but spleen greatly enlarged; appetite very poor. There was some orchitis present. Access of fever occurred at noon, preceded by severe chills and followed by profuse sweating. Temperature under the tongue, 41.3° C. Ordered phenocoll, 1 gram at a dose. This was followed by a diminution of the acute symtoms, but microorganisms could still be detected in blood.

July 5: Gave 1 gram in the morning and 1 gram in the afternoon.

July 6: Temperature under tongue 38.5° C.; no headache and no backache; better appetite; tongue began to clear. Plasmodia still in blood.

July 7: Ordered 2 more doses of phenocoll, 1 gram each, as before. Temperature under tongue, at 10 p. m., 38° C. Improvement continued; spleen begins to diminish in size.

July 9: Tongue perfectly clear; excellent appetite; splenic dullness very much diminished. Temperature under tongue, 37.2° C. Orchitis much improved.

July 10: Patient chilly at usual hour and showed afterwards a temperature under tongue of 39.3° C.; had a little nausea and a slight headache. Blood showed a few germs. Ordered 2 more doses of phenocoll a day for two days longer.

July 14: Patient has apparently recovered. Orchitis gone. No return of other symptoms. Temperature under tongue, 37.2° C. Tongue clean; appetite very good. No more plasmodia in blood.

July 16: Continued in good health; spleen apparently of normal size. Patient considers himself cured.

Case V, pernicious malaria.—M. F. G., male, laborer, aged 42. Had been sick for five months, with short intervals of slight improvement in symptoms. Was first examined on July 12. Complained of excruciating pain over the region of the spleen, this organ being greatly enlarged; liver slightly increased in size; no appetite; coated tongue; nausea and vomiting, but no diarrhea; on the contrary, constipation; suffered terribly from headaches. Accesses of fever occurred irregularly, sometimes in the morning, sometimes in the afternoon, sometimes at night. Patient felt chilly most of the time. Night sweats abundant and very annoying; slight dry cough, and loss of flesh. Careful examination, however, revealed nothing abnormal in the lungs. Had been taking quinine and arsenic, but had received no benefit. Rectal temperature varied from 38.2° C. to 40.1° C. Stopped all medication for a week, and placed patient under a nutritious diet only.

July 19: Examined blood in the morning, but found no parasites; blood examined again in the afternoon of the same day, when a few germs could be discovered.

July 20: Put patient on phenocoll; was ordered to take 2 grams (30 grains) a day.

July 22: Marked amelioration of symptoms; better appetite; no headache; night sweats very much diminished; cough disappeared; pain over the spleen less. Germs still found in blood. Temperature at rectum, 37.9° C. Continued the phenocoll as before.

July 24: Patient quite bright. All symptoms apparently gone. No more night

sweats. Rectal temperature, 37.2° C. Spleen greatly diminished in size. Plasmodia gone; suspended drug.

July 26: Patient suffered a slight relapse. Blood showed a few parasites. Ordered phenocoll for two days longer.

July 29: Patient considers himself cured. Blood free from germs. Spleen normal size, and no more pain. Rectal temperature, 37.2° C. Recovery was final, but ordered 1 gram of phenocoll daily for a week longer in order to avoid relapses.

I could cite more similar cases, but I will refrain from so doing at present. As has already been observed by previous investigators (and my experience is corroborative) phenocoll, like quinine, is not always able to combat successfully the malarial poison. In some of the cases under my care, the new drug failed to do any good by itself, but was successful when administered in combination with quinine; such cases having received no benefit from the previous use of the cinchona alkaloid alone. In other cases, which yielded perfectly to quinine and arsenic, phenocoll was powerless. Similarly, in a third class of cases, rebellious alike to arsenic and quinine, phenocoll did absolutely no good either, although it seemed to act always as an antipyretic. It is worthy of note that in most of these rebellious cases (at least in the majority of those in which the blood was examined microscopically) the plasmodia were generally found in the blood, even when the system was apparently saturated with either of three medicaments. Recovery in these rebellious cases was obtained alone by change of climate.

The following records may be of interest:

Case VI, Quotidian type.—A. G. L., female, housewife, aged 21 years. Disease of one week's standing. Accesses of fever occurred at noon, accompanied with all the characteristic acute symptoms of the disease. There was loss of appetite; coated tongue; pain over splenic region, with enlargement of the organ; liver also slightly enlarged. Patient had headache and backache; chilly sensations most of the time. Temperature under the tongue, 41.5° C. Patient first came under my observation.

July 8: Blood showed parasites. Placed her on full doses of quinine.

July 10: No improvement as yet. Complains of deafness and fullness of the head, in fact, of all the symptoms of cinchonism. Blood still showed germs. Temperature, 41° C. Discontinued quinine.

July 12: Patient about the same. Cinchonism, however, gone. Temperature, 41.2° C. Parasites still in blood. Resumed quinine.

July 14: Cinchonism reappeard, but no improvement in the condition of the patient. Temperature, 40.9° C. Plasmodia still present in blood. Discontinued quinine and waited for further developments.

July 17: Patient a little worse; quite weak; complains of headache, backache, and pain over the spleen. Temperature, 40.9° C. Did not examine the blood. Ordered phenocoll in 1-gram doses, twice a day.

July 18: Temperature, 38.5° C., but all other symptoms about the same. Plasmodia in blood. Continued phenocoll.

July 20: No improvemnt, but patient believes her fever is better. Temperature during the usual access, 38.2° C. Blood not examined. Discontinued phenocoll.

July 21: Patient worse. Temperature, 41° C. Blood showed parasites. Ordered a combination of quinine and phenocoll, 5 grains each, three times a day.

July 22: Some improvement in all symptoms; tongue not so coated; pain over spleen, very slight; no headache or backache; better appetite. Temperature, 37.6° C. Still a few plasmodia in blood. No symptoms of cinchonism. Continued combination.

July 26: Patient very bright and believes she is well. Spleen and liver reduced in size. No pain anywhere. Appetite very good. Temperature, 37.4° C. Could find no parasites in the blood. No cinchonism as yet. Ordered the continuation of the same medicine.

July 28: Patient apparently well. No fever, no pain, no parasites in blood. Liver apparently normal in size; spleen greatly diminished. Suspended the combination.

July 31: Found patient exceedingly bright. She eats with an excellent appetite. Convalescence may be said to have set in, and final recovery established.

Case VII, Quartan type.—P. N. Z., male, clerk, 24 years of age. Did not remember exactly how long he had been sick, but probably about three months, with a few intervals of improvement. Had taken quinine, then arsenic, to saturation of the system almost, without any benefit whatever. His chills and fever would come all the same. When first seen, June 29, he had not, according to his statement, taken any more medicine for about a week. He had been advised by friends to take lots of mescal (an alcoholic beverage manufactured from the century plant, agave, and almost worse than pulque so far as intoxicating properties are concerned). He had

taken a few full doses, but had received no benefit. Spleen much enlarged and painful; liver of normal size. Patient was weak and had absolutely no appetite. His temperature under the tongue varied from 38° to 39.5° C. I advised him to abstain from everything except, of course, food, for a period of a week.

July 7: Examined blood, and found that it contained malarial parasites. Ordered phenocoll, in 1-gram doses twice a day.

July 10: No effect. Temperature, 38.5° C., but patient about the same. Plasmodia in blood. Continued drug in same quantities.

July 12: No improvement, although temperature had been reduced to 37.8° C. Plasmodia still in blood. Continued phenocoll, 1 gram a day only.

July 14: Patient about the same. No amelioration whatever. Microorganisms present still in blood.

I continued to see this patient almost every day until July 18, but never noticed any improvement of any kind. I then suspended the phenocoll, and advised him to change climate and go to the mountains. He followed my advice, and about a week afterwards wrote to me that he was doing very well. According to further reports from the patient, recovery was apparently completely established in about three weeks from the time he had left home. In this case medicine was useless.

The few cases here detailed are sufficiently self-explanatory. I will, however, give a brief analysis of all the cases that came under my care, and which were subjected to the action of phenocoll alone. Twenty-eight cases were thus observed, of which 21 were successfully treated by the drug. In the other 7 the failure of the new medicament to do any good, was complete, although, as stated before, it always seemed to be able to reduce the abnormal bodily temperature. This is diametrically opposed to the statement of Dall'Olio, that is, as regards the value of the drug as an antipyretic; but it agrees with the experience of Cervello, who has stated that phenocoll is not only highly serviceable in intermittent fever, but that it is also a decided antithermic.

Of the 7 failures, 3 cases yielded afterwards to quinine, and the other 4 in which even quinine had done no good, were finally cured by the administration of arsenic.

In therapeutic doses, phenocoll possesses no poisonous properties and is well borne by the stomach. Some of my adult patients took 1, 2, and even 3 grams a day for four, five, and more days consecutively without experiencing any disagreeable after-effects from the drug.

Now, it would be of scientific interest to know how phenocoll, when successful, acts in malarial fever. Does it, as is claimed for quinine, exercise a direct influence on the plasmodia, destroying them or arresting their development? It is true, the remedy sometimes fails completely, as has been shown, to combat successfully paludal intoxication, this failure appearing to correspond precisely with the non-disappearance of the peculiar parasites from the blood of the malarial patients. The same phenomenon is sometimes observed with quinine and even arsenic, the administration of these substances being followed by no effect whatever on the disease in question.

It has been apparently demonstrated, particularly by the studies of Councilman, that quinine, as well as arsenic, fails to act upon the crescentic organisms. May not phenocoll behave in a similar manner?

That phenocoll may act directly upon the hæmatozoa precisely in the same way as does quinine is highly probable. The evidence brought forward in the few reports here given, as well as that of other of my cases not detailed in this paper, strongly indicates that the new drug affects the germs of malaria directly. The observations, again of Beck, appear to lead to the support of this view. This investigator found, indeed, "that phenocoll hydrochloride is probably as valuable an antiseptic as iodoform, and stronger than dermatol, aristol, iodol, pyoctanin, europhen, etc." Why may not the drug in question be also a bactericide? The point certainly is worthy of investigation.

Before concluding this imperfect paper, I wish to record my very brief experience with phenocoll in the treatment of neuralgic disease. Three marked cases of facial

neuralgia, occurring in females, yielded magically almost to the influence of the drug. One case of sciatica was very much relieved by phenocoll, but in another of similar nature the new medicament proved fruitless.

As may be observed, my experience with phenocoll in the treatment of malaria corroborates that of previous investigators. The drug can not, of course, be considered as a specific in the paludal malady, but so far as observations go these appear to show that phenocoll, though not able, perhaps, to entirely replace the good old cinchona alkaloid, may claim the serious consideration of the practitioner in the treatment of malarial affections. For the present, at least, the good results obtained warrant the further trial of the new medicament in paludal disease.

VENESECTION IN THE TREATMENT OF ENGORGEMENT AND DILATATIONS OF THE RIGHT SIDE OF HEART.

By I. E. ATKINSON, M. D., Baltimore.

Upon no point in therapeutics was there more settled conviction in the minds of medical men in the first half of the present century than in the matter of bloodletting. Open works of almost any of the great medical lights of that period and one finds the testimony in its favor never uncertain, never equivocal. In one form or another it was easily the sheet anchor of the remedial art. Yet a single generation, nay, even a decenary, saw it fall into disrepute, almost with complete desuetude. It is not my intention here to consider the influences that brought about this astonishing change, this unhesitating rejection of the experience of centuries, this discredit of the opinions and conclusions of those who in many respects still claim our reverence and admiration. It is an old story (and has its analogies in many phases of the history of our race) of a good thing abused, perverted, and misapplied until turned into an instrument of such malignant power that the evil springing from it, for a time at least, quite hid its true merit. So completely has general bloodletting fallen into disrepute that it may be said safely that a majority of the medical men of the present generation have never seen, much less done, the operation of venesection. Yet, throughout these years of its humiliation, there have never ceased to be those who have held up the standard of venesection, though, for the most part, in so half-hearted, timorous fashion, that they have rather weakened their cause by the feebleness of their defense. There has been some sign, of recent years, of a disposition to reconsider the therapeutic claims of venesection in a judicial spirit and from a clinical, not a theoretical, standpoint. Surely at this date partisanship and prejudice need form no factors in such a research and, although we can hardly expect a justification of the statement made so recently as 1860 by no less an authority than the late Pro. George B. Wood (Therapeutics and Pharmacology, etc., 1860, Philadelphia, Vol. II, p. 37), that there is no more important remedy than bleeding, perhaps none which so frequently saves life, it seems likely that we will find that our therapeutic predecessors were not so hopelessly in the wrong after all.

It is not my purpose to consider in this paper the general question of bloodletting. I intend to refer briefly to but one of its aspects, one, however, in which the indications for its employment are so clear, its beneficial effects so prompt, remarkable, even life-saving, that there remain hardly any grounds for discussion. I refer to the mechanical relief to be afforded an overtaxed, distended, and dilated right heart by the abstraction of blood. This procedure receives such abundant justification both in theory and practice that an apology might almost be expected for recommending it before such an assembly as this, especially since it has been advocated repeatedly with far more convincing argument than I shall be able to offer in this short paper, and more recently by Lafleur (Bull. Johns Hopkins Hospital, August, 1891) and Pye-Smith (Med. Chir. Transact., Lond., Vol. LXXIV). The revolt against

venesection, however, has been so widespread and complete that it is only by persistent advocacy that we may hope to see it rehabilitated, even in its most important applications.

Overfilling and incomplete emptying of the right ventricle may be brought about by any persistent obstacle to the free passage of blood from this chamber to the arterial circulation. Nearest the right ventricle the obstruction may be in the pulmonary circulation, as from bronchitis associated with the diminished vascular supply consequent upon the atrophic changes of emphysema, etc., or it may depend upon defects of the mitral orifice and valve; finally, but only after secondary and relative incompetence of the mitral valve, alterations at the aortic orifice and valve may form the exciting cause. Of these influences the mitral changes have most potency, mitral stenosis more notably, for reasons that are obvious and not necessary to be designated here; but in consequence of the more frequent occurrence of mitral insufficiency the latter lesion will be found to be the exciting influence in the majority of cases. Disturbances of the right side of the heart are not very prone to occur so long as hypertrophy of the ventricle is able to supply an increased energy sufficient to afford compensation to the obstructed circulation in front of it. It is only after failure of this muscular hypertrophy has begun and weakening of its power with dilatation and increased capacity of the ventricular chamber have set in that the condition we are considering is apt to arise. This usually occurs by a gradual development after long standing and slowly augmenting valvular defect; but it not unfrequently is precipitated by sudden intervention of obstruction in excess of that already present.

The most important of these intercurrent processes may be located in the lungs, as from a pneumonia, a bronchitis, especially in the presence of old emphysema. However occurring, whenever this condition is encountered venesection affords a remedial measure of remarkable power, but when the engorgement is the consequence of a rapidly developing obstruction to an already laboring right ventricle its good effects appear, at times, to be almost magical. The clinical indications for venesection under the circumstances we are considering may be quoted from an excellent paper on the therapeutical value of venesection by Dr. Pye-Smith as "general venous congestion with arterial anæmia indicated by cyanosis with dyspnœa, turgid veins, swollen liver, albuminuria, pulsation in the jugular veins, and at the epigastrium, functional incompetence of the tricuspid valve (sometimes indicated by a systolic murmur and a weak, small, and fluttering radial pulse.") The pathological chain of which these symptoms are the expression usually begins with an arterial anæmia, having its origin in an unfilled or an imperfectly emptied left ventricle, unfilled in consequence of an obstructed mitral orifice or an obstructed pulmonary circulation, imperfectly emptied, in consequence of an insufficient mitral valve. The blood obstructed in its onward passage in one or the other or all of these ways backs up into the system of the right heart, the pulmonary artery, the right ventricle, the right auricle, and into the general venous system.

The brunt of the struggle is with the right ventricle, which, unable to overcome the obstacle in front by its systole, distended during diastole by the increasing pressure of blood from behind, becomes overfull, stretched, incapable of orderly and vigorous contraction and in immediate peril of succumbing to the burden thrown upon it. As the distention of this muscle increases, so does its power steadily diminish.

Many therapeutic measures are resorted to for the relief of this condition of passive engorgement with greater or less success, but no measure will so safely, so pleasantly, so speedily, so frequently afford relief, even avert impending death as the judicious practice of venesection. By it the torrent of blood is checked and diverted, the ventricle relieved of the pressure, contracts, gathers force and rhythm, and relief, often but temporary, rarely permanent, is secured. Naturally, in many cases, all remedies fail and the patient dies; in many again the relief is only transitory, but in a fair number where the circulatory obstruction is acute, as in the sudden bronchitis that at times surprises an old emphysema with its resulting weak heart,

the relief will be permanent. Taken altogether, I desire to claim openly that in the conditions above described, where the danger to the life of the patient is rapidly developed and imminent, the letting of blood offers greater chances of relief than any other remedy.

From a number of cases of successful venesection for the condition under discussion, I have selected the following:

Mr. W., unmarried; 40 years old; a builder and contractor; of medium height and robust frame. Mr. W. had had a healthy youth and early manhood. He now had scarlatina or diphtheria; some rheumatic pains in the ankle joint three years ago, but not severe enough to disable him. For years has been addicted to rather free alcoholic indulgence. He is of an active, energetic temperament. Was not thought to have heart disorder until the preceding winter. He never fainted nor complained of palpitation. Early last spring had occasion to consult a physician on account of dyspnœa. He became orthopnœic and mildly cyanotic, and had very feeble and irregular heart action. This condition lasted a number of weeks, and he slowly improved and finally resumed work. There was said to have been no albuminuria and no dropsy. He did fairly well until attacked by the prevailing influenza. This followed an ordinary course and left him with some bronchial catarrh. On January 8, 1890, he went out-of-doors, and on the 9th was seized with severe cough and dyspnœa. Symptoms of active pulmonary engorgement rapidly developed, and on the 11th, at 10 o'clock p. m., I was called to see him in consultation with Dr. L. McLane Tiffany. He was then sitting up in bed, livid; temperature, 103° F.; respiration, 55 to 60; pulse unaccountable at the wrist, being extremely feeble, irregular, unequal, and frequent.

His cough was almost incessant and brought up a very copious amount of currant-jelly-like sputum, lacking, however, the tenacious appearance of ordinary pneumonic sputum. It runs very free and liquid. He was breathing noisily and with great difficulty. Coarse and fine moist râles were heard all over the chest, quite masking the heart sounds. There was no tubal breathing. Percussion was dull, but not flat, over both lower lobes posteriorly. There was no albuminuria. A hypodermic injection of $\frac{1}{4}$ grain of morphia, with $\frac{1}{150}$ grain of atropine sulphate, was given at once, and 12 drops of tincture of digitalis given every third hour. A milk diet. 12th—easier. Sputa still copious and deeply stained; orthopnœa; respiration 48, temperature 101; cardiac pulsation 120 to 140, very irregular, intermittent, and unequal. Many pulsations not perceptible at the wrist. Apex beat felt in fifth intercostal space $2\frac{1}{2}$ inches to the left of left nipple. Very little heaving impulse. Cardiac dullness (relative) extends at level of the fourth rib, from the right border of the sternum, 11 cm.; in fourth intercostal space, from 1 cm. to right of right sternal border, toward the left, 16 cm. Heart sounds heard with difficulty, but a systolic murmur, not loud, but of a rasping character, was detected. There was no albuminuria or anasarca.

During the 13th, 14th, and 15th there was no decided change. Cough, dyspnœa, cyanosis very pronounced and surface bathed in cold sweat. No nausea, continued digitalis. Complained of intense pain in right infra-mammary region and hypochondrium. Border of liver dullness two finger-breadths below costal margin. This region was quite tender to pressure. 16th—chest clear, sputa losing color, but general condition very bad. Some delirium, cyanosis increased, extremities cold. Surface bathed in sweat, slight albuminuria. Some œdema of ankles. Expression very bad. Eight ounces of blood were drawn by cups from the right hypochondrium. This was followed by immediate relief of pain and much easier respiration (42). Pulse slightly stronger, but systolic still most incomplete. During this day took 8 drops of tincture of strophanthus every fourth hour, but his condition grew so rapidly worse that it was abandoned. When the cupping was done death seemed imminent. Pulse almost imperceptible at the wrist, deep cyanosis, urgent dyspnœa, cold sweats, slight albuminuria. 17th—some general improvement in the morning, but symptoms all became aggravated during the day, and at 10 o'clock p. m. was in extreme distress. Pulse at the wrist 96, while at the præcordium 120, very unequal pulsations could be heard. Eight ounces of blood were rapidly drawn from the right arm. While the blood was flowing the patient expressed decided feelings of relief and the radial pulse became at once stronger and more regular. He presently fell into a sweet sleep in a semirecumbent position. His complexion cleared, his surface became warm and dry, and the most comfortable night he had had followed. On the 21st the cyanosis had disappeared, as had also the albuminuria. He took nourishment well and gave every evidence of improvement. Respiration 36, temperature 100° F. Improvement was steady and in two months he resumed business. The mitral murmur and cardiac irregularity persist, but there has been no return of the grave symptoms; at the moment of venesection the symptoms gave both Prof. Tiffany and myself the impression of impending dissolution, but from that moment amelioration was as apparent to the patient, and his attendants as it was to us.

THE USE OF NITROGLYCERIN IN ARTERIOSCLEROSIS.

By THOMAS G. ASHTON, M. D.,

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But a little more than twenty years have elapsed since arteriosclerosis was first demonstrated to be a distinct and definite disease, and, as is well known, it is to Gull and Sutton to whom we are indebted for this addition to our medical knowledge.

It is necessary for us to fully understand the nature of arteriosclerosis in order that we may clearly appreciate the reasons advanced for the employment of nitroglycerin in its treatment. Equally important, also, is it for us to have a clear idea of the drug's physiological actions.

The most commonly accepted theory explaining the manner of the development of arteriosclerosis is that advanced by Thoma in a number of articles published in Virchow's Archives. Thoma finds the development of the disease to depend upon a series of conditions which conform to the following law, viz:

A slowing of the blood current in an artery that is not at once and completely counteracted by a proportionate contraction of the media leads to new growth of connective tissue in the intima, which lessens the lumen of the affected vessel, and thus restores the normal swiftness of the blood current more or less completely.

According to this law, therefore, the lesion has its origin in the media which, in some way not known, has lost its tone. As a result of this impairment of the elasticity of the media the artery dilates and, as a consequence, the normal swiftness of the blood stream is lessened. The slowing of the blood current produces, in turn, a hyperæmia of the vasa vasorum and a new growth of connective tissue in the intima, with which there is subsequently associated a similar formation in the media and adventitia. So soon as the growth of new tissue reaches such dimensions in any situation that the normal swiftness of the blood current is thereby reestablished, the sensitive nerves are restored to their normal condition, the hyperæmia of the vasa vasorum disappears, and no new tissue forms in the intima until the blood current again undergoes changes of speed and again makes operative the various factors originally involved in the production of the disease.

Now, let us see how the changes in the arterial walls will affect the various tissues and organs the nutrition of which it is the function of the blood vessels to provide for. As this degeneration is characterized by a more or less distinct swelling, the compensatory thickening of the intima projects to some extent into the lumen of the vessel, and thus interferes with the blood current. In the same manner is the orifice of the blood vessel narrowed at its point of branching off from the parent vessel.

Various and grave disturbances of nutrition may, of course, result in the organs to which these branches go, and it is conceivable that often thus a vicious circle is established. Thus, the diseased arteries supply less blood to a given organ than its proper nutrition requires and local degenerations ensue in the organ. These changed conditions call for still less blood, and there results a further disturbance in the rapidity of the current in the affected artery. This causes further changes in the vessel's intima. (Peabody.)

Thus we will find that the same vicious circle that becomes established in the various organs of the body involves with them the arteries themselves. The vasa vasorum, sharing in the general sclerotic change, supply less blood to the arteries than is required for their proper nutrition; further degeneration of the arterial walls follows, calling for less blood for nutritive purposes, which produces in turn a slowing of the blood current in the vessels supplying the arteries; consequently the intima of these vessels become the seat of further degenerative changes.

We have found, therefore, that we are dealing with a disease one marked feature of which is a mechanical interference with the blood current due to progressive

narrowing of the lumen of the blood vessels, and that a necessary result of this obstruction is a lessening of the supply of blood essential to the nutrition of the tissues, resulting in various tissue degenerations.

Let us see, now, what are the properties of the drug with which we propose, if not to permanently arrest the progress of the disease, at least to ameliorate its striking and annoying symptoms.

When a dose of nitroglycerin, large enough to produce the physiological effects is taken there follow more or less flushing of the face and a feeling of fullness of the head which, in some individuals, is accompanied by dizziness. These manifestations are the result of dilitation of the superficial vessels which, according to Brunton, is due to weakening or paralysis either of the muscular walls of the arterioles themselves, or of the vasomotor ganglia in or near them. That the effects of the drug are not due to its action upon the sympathetic acting upon the muscular structure of the arteries through the vasomotor center he demonstrates by showing that the nitrites lower the blood pressure in animals even after the cord has been divided just below the medulla.

Nitroglycerin, therefore, lowers blood pressure by producing a dilatation of the arterioles, and it is upon this dilatation of the arterioles that the value of the drug in the treatment of arterio-sclerosis depends. We found that in arterio-sclerosis, because the tissues receive too little blood for their proper nutrition, local degenerations occur, and that these local degenerations, disturbing again the equilibrium of the circulation, cause still further sclerotic changes to occur in the arterial walls. By causing a dilatation of the blood vessels, and thereby supplying the tissues with a larger amount of blood for their nutrition, not only will the progress of degenerations in the various organs and tissues be retarded, but the course of the disease will also be arrested in the arteries themselves by supplying them, in the same manner, with a large quantity of blood.

The most important clinical manifestations of arterio-sclerosis are directly due to the condition of the blood vessels, which interferes with the blood supply to various organs.

The following cases, briefly cited, will give a clear idea of the chief of these symptoms and to what extent nitroglycerin may be relied upon for their relief:

Case 1.—J. McL., aged 28; a lumber salesman; family history negative; patient for past ten years, in following his occupation has had a very exposed life, and, in addition, has been subjected to arduous railroad traveling, which in the course of a year covered many thousands of miles. The symptoms mostly complained of were vertigo, headache, and palpitation of the heart. The examination of the heart showed no enlargement of that organ; the first sound, however, was louder and longer than normal and the second sound was markedly accentuated. The radial at the wrist showed decidedly thickened walls. Arterial tension was increased. Urinalysis showed albumen to be present in small quantities. The average amount of urine passed in twenty-four hours was 70 ounces. The microscope revealed hyaline casts. Nitroglycerin was administered and pushed until physiological effects were produced. Its effect upon the headache, vertigo, and palpitation was almost immediate, and in three months the albumen and casts had entirely disappeared from the urine. The drug was then suspended. In two months, however, the patient returned with the original symptoms present and albumen and casts again in the urine. Nitroglycerin was again administered with the same results as upon its previous exhibition. With occasional intermissions the patient was kept upon nitroglycerin for the period of one year. It is now over a year since treatment was suspended and there has been no reappearance of the albuminuria or other symptoms.

Case 2.—P. C., aged 45; a tailor. Family history not obtainable. Patient in appearance a man of fully 65 years of age. For many years had habitually used alcohol to excess. Complained of headache, intense vertigo, causing him at times to fall in the street, and impairment of memory. An eye examination showed some recent, and many old, retinal hemorrhages. Urinalysis revealed albumen; quantity of urine voided in twenty-four hours increased; microscopically were found hyaline and some granular epithelial casts. The superficial vessels showed a marked degree of sclerotic change, and arterial tension was greatly increased. The heart was considerably hypertrophied; first sound prolonged and booming in character, and

second sound markedly accentuated. The patient was first put upon treatment over three years ago, nitroglycerin being the remedy selected. While no curative result has been obtained, yet the drug accomplished an undoubted retardation in the progress of the disease, in addition to the almost completed disappearance of the cerebral symptoms, including a marked improvement in the memory.

The above cases, selected from a number that have been under observation, will suffice to illustrate the uses of nitroglycerin in arterio-sclerosis.

As previously stated, the chief symptoms of arterio-sclerosis are due to the malnutrition of various organs, resulting from a lessened blood supply; nitroglycerin relieves these symptoms by increasing the blood supply of any given tissue. The cardiac hypertrophy, however, so common an attendant upon this disease, is caused by increased peripheral resistance. By lowering the blood pressure and, according to Bartholow, by removing the inhibition exercised by the pneumogastric nerve, thereby lessening the work of the heart, nitroglycerin results in relief of this condition. The advantages from the use of the drug in attacks of angina pectoris are too well known to require discussion.

Because nitroglycerin lessens arterial tension and thereby diminishes the amount of urine voided and lessens the output of albumen; and because it increases the blood supply to the kidneys, and therefore improves their nutrition, and prevents further degenerative processes, is its exhibition advantageous in the renal changes accompanying arterio-sclerosis.

Nitroglycerin is best administered in the form of a centessimal solution or as tablet triturates, each containing $\frac{1}{100}$ of a grain of the pure drug.

Inasmuch as the susceptibility to the action of the drug varies very greatly the dose can not be stated in advance. It is therefore advisable to begin with a dose of $\frac{1}{100}$ of a grain, watching its effects, and increase it until the physiological actions of the drug become manifest. In some individuals small doses will continue to maintain the physiological effects of the drug, while in others, as in a case sometime since reported by Dr. D. D. Stewart, of Philadelphia, a remarkable tolerance, even to massive doses, becomes established. According to my own experience those cases respond best to the use of the drug in which small doses continue to maintain its physiological manifestations.

The effects produced by nitroglycerin upon the pulse vary somewhat, though not materially, in duration in different individuals. In one of my cases the effects of a dose just sufficient to produce the physiological actions did not disappear from the sphygmographic tracing for nearly three-quarters of an hour.

According to Murrell, however, whose observations upon the subject have been made with great accuracy and have become to be regarded as authoritative, the tracing resumes the normal in less than half an hour. As the effect of the drug is but transient, therefore, the interval between the doses should not exceed two or three hours.

Nitroglycerin tends to arrest the oxygen-carrying function of the red blood corpuscle, and it is therefore important not to give it in doses larger than necessary to produce the desired effects, and during long-continued courses of the drug to interpose frequent periods of abstinence from its use.

Arterio-sclerosis is a progressive disease and it is not claimed, therefore, that nitroglycerin will effect a permanent cure. It is claimed for the drug, however, that it will retard the progress of the affection and alleviate many of its most distressing and serious manifestations.

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THE ANTIPYRETIC ACTION OF CALOMEL.

By Drs. R. J. NUNN and A. B. SIMMONS, Savannah, Ga.

The manifold uses of calomel and its prominence in our armamentarium for centuries would naturally cause one to hesitate before claiming for this old remedy any new application in therapeutics. That it has been used in all diseases is beyond question, but its contemplated action has not always been very clear.

Those physicians who can draw upon an experience of thirty or forty years will readily recall the fact that it was at that time conceded by the profession that antiperiodics did not act well unless preceded by a good large dose of calomel. This was the result of clinical observation, but there never was an explanation offered except by referring to the cathartic action of the medicine. In those early days the thermometer as a clinical aid was unknown, and shortly after calomel became an unfashionable remedy, except among a few old fogies, and hence it probably is that its antipyretic action has not been investigated. Now, however, circumstances have changed somewhat, and the thermometer has enabled us to scientifically confirm the accurate observations of the past generation and give special prominence to one more of the many valuable properties possessed by this almost indispensable drug.

In the treatment of continued fever with a typhoid tendency, the chief desideratum is a remedy that will produce intestinal antisepsis and a reduction of high temperature at the same time, without the depressing constitutional effects usually seen with these agents. During the past months, in a series of severe fevers, some of a typhoid character and others of a simple continued type, and in which the usual remedies, such as the synthetic compounds, salol, phenacetin, acetanilid, and allied preparations failed to reduce the temperature, calomel has seemed to meet every indication, not only producing a rapid fall in temperature, lasting from twenty-four to forty-eight hours, but giving a marked amelioration in all symptoms.

We gave it in 10-grain doses, and usually in combination with soda, bismuth, and pepsin. The dose was repeated as soon as temperature increased. This, and this alone, has been our indication for its repetition. That it has aborted some cases we are convinced; that it has modified all we know. So far we have found no contraindications, neither in diarrhea, tympanites, albuminuria, nor hemorrhage, but in each have had only the best possible results.

There has not been a single case of ptyalism, nor any ill effect of any kind, although very large quantities have been given, one patient taking during a sixteen-day attack as much as 1 to 3 drams. This is one of the most peculiar results connected with our cases. In none has there been the least symptom of mercurial poisoning, no tenderness of the gums, no increase of salivary secretion, no swelling of glands, no mercurial odor of breath. This tolerance of calomel is truly remarkable. The reduction of temperature commenced as soon as given, in some instances giving in an hour's time a reduction of 2 or even 3 degrees, and remaining down from twenty-four to forty-eight hours.

The carthartic action has been mild, not producing more than 2 or 3 stools, without pain and straining.

After the first few days (while the calomel had but little effect on the duration of the disease) its antipyretic action was as much marked. It is peculiarly applicable in those cases in which there is high temperature with cold, clammy skin, in which other agents used in controlling high temperature would not be available. In such the reduction was just as apparent, seeming to change the condition to such a degree, that an external heat would be substituted for an internal one with external cold, and hence more readily and easily managed.

The happiest results have appeared in those cases with constipated bowels. Here the abortive action was greatest, in some instances converting a fever with high temperature to one of lower grade after a few doses, and with the judicious use of agent temperature would not again reach a dangerous point.

A few times the administration of the calomel was followed by hypercatharsis, but, as we have said, this did not contraindicate its use when there was another exacerbation of fever, and upon its repetition would act mildly, and at other times would produce no stool at all, but even then the antipyresis was produced. In what manner the agent acts we will not attempt to say; we are only recording some clinical facts seen in a busy practice. By trial we find that when given in powder (not in capsules) the reduction of temperature is more rapid, reaching a lower point, and remaining down for a longer period.

This would argue that possibly there was some lesion in the upper bowels, on which the agent acted directly. We believe that there was seen also a special action on kidneys, the urine being more copious and of higher color.

No one agent in our hand has had the same controlling influence over high temperature in the condition peculiar to these fevers. Nor has any agent so modified the general symptoms and given control over an otherwise unmanageable case.

In some instances it has been necessary to repeat the remedy within the same day, the fever not being influenced by the first dose; the second was, however, followed by the reduction of temperature expected, and even in those cases there was not excessive catharsis. The reduction of temperature is not followed by copious sweating, an objection to some remedies when used often.

The fall of temperature usually reaches its minimum point in six hours, remains stationary for several hours, and then gradually rises again, sometimes taking twenty-four hours or more to attain its former height. During convalescence, when there was recurrence of fever owing to some indiscretion in diet, or other cause, the same marked effect was noticed after a large dose of calomel.

All cases have gone on to a rapid recovery after this treatment. There has been but one relapse in 25 cases in which this treatment was used. We do not know how it would be in a larger series of cases, the number being too small to form any opinion in this respect.

We recognize that the remedy is a powerful agent for evil, as well as good, and that harm might occur after such heroic treatment, but such evil result we have not observed. This agent, we think, will prove a potent factor for good upon further trial in these diseases.

Only after much experiment can we name its exact position as an antipyretic, and it is only after much painstaking care and trial that we have arrived at this conclusion. We have tried smaller doses, but they did not reduce temperature, nor did they ameliorate the other symptoms. The combination with pepsin and bismuth has shown its superiority over any other that we have made, and we have tried many.

No claim is made that calomel is a specific in these diseases, or that it would have antipyretic action in other conditions of high temperature, but in these continued fevers of typhoid types, it is certainly a valuable adjuvant in their management, particularly in the reduction of a high temperature to a less dangerous degree. We

know that many physicians claim that high temperature is conservative and shortens an attack, but such is not our experience, but the reverse.

From the use of calomel in these 25 cases we have drawn the following conclusions: First. Calomel is a sure and safe antipyretic, reducing the temperature from 2 to 3° in a few hours. Second. Small doses will prove of no avail. Third. The ingestion of large doses was followed by no untoward event, no ptyalism, no hypercatharsis. This is contrary to the usual opinion. Fourth. Diarrhea, hemorrhage, albuminuria, tympanites have not been contraindications to the use of the remedy. Fifth. The reduction of temperature occurs without cathartic action on the bowels. Sixth. The calomel acts best in combination with soda, bismuth, and pepsin. Seventh. That in some instances the remedy appeared to cut short an attack, and in others, while having no influence on its duration, it modified all symptoms, and by keeping temperature in check aided materially in the management of the case.

Appended are reports of two cases, one of the simple continued type, the other of a typhoid character:

Case I.—October 9, 1892: Had fever for several days; pain in stomach, back, and head; skin dark; eyes yellow; tongue coated heavily with white coat and dry; complained of soreness all over body; temperature, 102½; pulse, 88; bowels, constipated; prescribed 10 grains of calomel at once, with small dose of quinine. For several days he had been taking large doses of quinine.

October 10: Bowels had acted freely; pains had diminished; temperature, 101; pulse, 90; complained so much of chinchonism that quinine was discontinued.

October 11: M. Temperature, 101½; pulse, 100; pains in bowels, but no tympanites; repeated calomel, and also gave carbolic acid, 1 drop, and tincture iodine, 2 drops, every four hours. Evening: Temperature, 100; pulse, 92; had several vomiting attacks during the day.

October 12: M. Temperature, 102; tongue, moist; bowels had acted several times; much nausea; calomel repeated.

October 13: M. Temperature, 100; no pain or nausea; bowels had acted several times from calomel.

October 14: M. Temperature, 99½; pain in head; calomel repeated.

October 15: Temperature, 99; gradually decreased, and patient was discharged on the 18th.

Case II.—October 26: Mary W., aged 15 years; had fever for one week, with an occasional chill; bowels running off; pain in head and limbs; tympanites marked; pain in right iliac region; tongue coated with brownish coat and very dry; temperature, 103; pulse, 112. Gave 10 grains of calomel, soda, and bismuth, with small dose of quinine and phenacetine; milk diet.

November 2: Temperature, 99½; pulse, 100; bowels still moving rapidly. Gave carbolic acid and iodine mixture 3 times daily.

November 3: Temperature, 101; pulse, 94; chill during the night; bowels checked. Quinine, 5 grains, 3 times daily; calomel and bismuth repeated.

November 4: Temperature, 100; pulse, 95; bowels moved frequently after purgative.

November 5: Temperature, 101½; pulse, 94; bowels free; tympanites not so great. Calomel and bismuth repeated.

November 6: Temperature, 101½; pulse, 92; bowels in check; tympanites increased.

November 7: Temperature, 101½; pulse, 100. Calomel and bismuth repeated.

November 8: Temperature, 100¾; pulse, 100; bowels under control; tongue clean.

November 9: Temperature, 100¼; pulse, 96.

November 10: Temperature, 100; pulse, 100; bowels loose.

November 11: Temperature, 103; pulse, 106; tympanites pronounced; chills during the night. Calomel and bismuth repeated.

November 12: Temperature, 101½; pulse, 106.

November 14: Temperature, 103¼; bowels frequent. Calomel and bismuth repeated.

November 15: Temperature, 100½; pulse, 106; tympanitic bowels.

November 16: Temperature, 103½; pulse, 106. Calomel and bismuth repeated.

November 17: Temperature, 99¾; pulse, 96; bowels lax.

From this the temperature gradually declined until the twentieth day, when the temperature became normal, and convalescence rapidly followed.

THE TREATMENT OF NEURASTHENIA, WITH SPECIAL REFERENCE TO THE REST CURE.

By F. X. DERCUM, M. D.,

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Notwithstanding the many advances made by modern therapeutics, nervous exhaustion in its various forms still remains one of the most trying and difficult conditions with which physicians have to contend. It presents such varied symptoms and is often so generalized in character that some writers even deny it the position accorded to other affections. However, even if it be not as sharply outlined as other diseases, one must admit that there is a genuine morbid state of the nervous system present in the condition known as neurasthenia. Because many of the symptoms are subjective, and because patients frequently find it difficult to give us an accurate conception of the various morbid sensations which they experience, the outlines of a given case are often vague. However, the fact that certain symptoms or groups of symptoms constantly recur, and the fact that we have such definite etiological factors as prolonged nervous strain, exhausting illnesses, and great physical or mental shock, proves that we have a well-established clinical entity before us.

Neurasthenia has always been regarded as an affection without a pathology. However, C. F. Hodge[1] has shown that in nerve cells certain changes take place, due to functional activity. These changes affect all of the cell contents, and there can be no doubt that they are characteristic of fatigue. These facts render it extremely probable that there not only is a pathology to neurasthenia, but that this pathology is to be sought for largely in intracellular changes.

Hodge, it will be remembered, proved that as a result of electrical stimulation the nuclei of nerve cells decrease markedly in size, and that their outlines, instead of remaining smooth, become jagged and irregular, and that they also react differently to staining reagents; and further, that the cell protoplasm undergoes slight shrinkage in size, becomes vacuolated, and also reacts differently to staining reagents; and finally, that even the cell capsule itself, if present, shows changes in the size of its nuclei. He further rendered it extremely probable, as is well known, by his researches upon birds and bees, that these processes take place equally in normal fatigue. Among the most interesting results achieved by Hodge is also the demonstration that exhausted nerve cells recover their normal appearance if allowed to rest for a sufficient time, and, further, noted the fact that the process of recovery is slow, requiring many hours of rest.

Certainly we have in these facts a hint as to what is present in the condition which is known as nervous exhaustion. It is probable that the nerve cells in a typical case undergo changes similar to those which have been described by Hodge in his experiments. However, it is probably characteristic of neurasthenia that repair either does not take place at all or always imperfectly. It seems to me that this hypothesis enables us to understand many of the symptoms presented.

The underlying feature of nervous exhaustion is a diminution in the capacity for the sustained expenditure of energy. If it be true that the nerve cells have undergone changes similar to those described by Hodge, and if it further be true that for some reason complete repair has not taken place, we have all the conditions necessary to explain this symptom. Not only do the results of Hodge furnish us with an explanation of the condition presented by the efferent or motor side of the nervous apparatus, but they also render comprehensible many of the sensory and subjective symptoms.

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[1] Journal of Morphology, Vol. II, p. 95.

For instance, the backache and the headache present in neurasthenia are, if we pause to analyze them, peculiar in that they resemble the sensations often produced by normal fatigue. They seem to be grossly exaggerated fatigue sensations. Certainly the backache of neurasthenia differs from the backache of lumbago, or the backache due to actual disease of the spine or spinal contents. Certainly, too, the neurasthenic headache differs markedly from headaches due to other causes. Not only are symptoms present in the sensory and motor spheres which would suggest exhausting change in the nerve cells, but also, as is well known, in the vaso-motor apparatus and in the behavior of the various glands and viscera. In the tendency to irregular flushing, in anomalies of sweating, in the anomalies of the secretion of urine, in the general atony of the digestive tract we have instances of this condition. Certainly our position relative to neurasthenia has been materially improved by the researches of Hodge, inasmuch as they enable us to formulate a rational and conceivable pathology of this curious affection. From what will be said further on it will be seen, however, that the researches of Hodge, even in their fullest application, do not yet enable us to explain all that is found. Certainly such curious symptoms as the tinnitus aurium, the persistent throbbing in the limbs, and the various chill-like creeping, and other strange anomalies of sensation which we meet with, still lack an explanation.

Further, another element makes its appearance when we reflect that when morbid processes continue for a length of time they are apt to be followed by more or less permanent changes, changes that we are in the habit of referring to as "terminal changes" in discussing other diseases. We see at once that the pathology of neurasthenia may be a very complicated one. Some of these changes can occasionally be traced. Such, for instance, are the changes which are sometimes noted in the blood vessels of chronic neurasthenics. In persons who have been the victims of nervous exhaustion for years, and in whom repair has never had an opportunity of fully asserting itself, we find occasionally that the blood vessels have become more or less thickened, that is, they show changes of age at a relatively early period and the heart also gives evidence of the same thing. In neurasthenics in whom the trouble has been profound and who have suffered for very many years atheroma of the blood vessels can frequently be detected with very great ease. Certainly when the blood vessels and heart give us the signs of premature age, we have every reason to believe that all of the other tissues share more or less in this process, that is, in a general tendency to premature senescence. These changes, I say, can occasionally be traced in the blood vessels. I believe that they also take place in the muscles and even in the bones, but of this direct proof is as yet wanting. It is extremely probable that the nervous system itself will in the future studies made under more exact and favorable conditions show changes on a par in their significance with those which are occasionally found in the blood vessels.

Recognizing, then, the fact that in neurasthenia the nerve cells undergo a change which is in all probability similar to that which they undergo in normal fatigue, and that added to this we have due to the persistence of fatigue in all probability secondary or terminal changes taking place, we can readily understand how it is that some of our neurasthenic cases are so inveterate, why it is that some of them yield so little to even the most radical treatment.

A third element which largely influences the results of treatment lies in the fact that some of our patients are what might be called hereditarily neurasthenic, i. e., persons who make their start in life with a nervous system in which cell wear and tear takes place readily and in whom recuperative power is unusually feeble. We have met these cases, they are peculiar in the fact that their neurasthenia is manifested relatively early in life, they are apt to be feeble as children, often, but not always, of small physical development, and are persons in whom fatigue is brought about by very slight exertions, either mental or physical. I know of no more unsatisfactory class of cases to treat than these cases of hereditary neurasthenia.

The factors, then, which influence the results of treatment in neurasthenia primarily are, first, whether we have a hereditary case to deal with; secondly, if not hereditary, the time for which the neurasthenia has lasted; thirdly, in nonhereditary cases, the result is influenced, according to my individual experience, as to whether a given case be the outcome of prolonged nervous strain, or whether it has been suddenly produced by a physical or mental shock. The last group, or the traumatic neurasthenics, so called, are, in my experience, more difficult to treat than those in whom the neurasthenia is acquired in other ways.

With these preliminary observations, let us now turn our attention to the means that we have at hand for the treatment of a case of neurasthenia. From what has been said it is evident that rest is an imperative factor, certainly if the waste be rapid and repair be slow, the diminution of function—the securing of as complete a rest as possible—is the object to be aimed at. We all know that absolute rest, physiologically speaking, is an impossibility, but at the same time that the degree of relative rest which is practicable to obtain is very great. The question in any given case naturally turns at once, how much rest does this case require? Every practical physician knows that it is most frequently impossible for persons actively engaged in pursuits of life to take absolute rest, nor in fact is absolute rest always a necessity. Very frequently the most astounding changes can be brought about by relative rest.

In the high pressure of modern civilization, especially as is represented on this continent, the temptation to overwork is extreme, and, in very many cases of neurasthenia, if the unphysiological excess of work be stopped, recovery will result. You are doubtless, all of you, familiar with the scheme of "partial" rest, so called, instituted by Dr. Mitchell, in which the patient, often an active business man, is directed to prolong the hours of rest in bed, to rise not earlier than 9 or 10 in the morning and to retire with the onset of evening. A man following this direction must necessarily curtail the hours devoted to work, and very often this simple expedient is sufficient to bring about a most favorable result. However, cases are brought to us of greater and greater severity, cases which vary from those in which a few hours rest in bed during the day is requisite, to those in whom absolute rest for weeks and months is imperative.

How much are we to expect from rest? As I have already said, it is exceedingly probable that permanent or terminal changes are often present in neurasthenia. This factor, of itself, necessitates that the results to be attained by rest will, in given cases, be limited. In others again it will be followed by the most gratifying results.

Finally, regarding the rest, let us remember that if our case of neurasthenia be a profound one and of long duration, that this rest must be as nearly absolute as it is possible for us to make it. Dr. Weir Mitchell has already pointed out how this is to be accomplished, how in very bad cases the patient is not even allowed to feed herself, is not even allowed to turn in bed without the assistance of the nurse, is not even allowed to leave the bed to void the bowels or urine. Now, while rest is undoubtedly a factor of prime importance, rest of itself, as Dr. Mitchell has shown, is not without its attendant evils. (*See* Seguin Lecture, and Fat and Blood.) It is well known that a joint, if not moved, will stiffen, and finally become anchylosed; it is well known that a muscle which is not exercised will waste away, and it is probable that analagous changes take place in other tissues. How to combat these evils is a problem which now presents itself. If we exercise our patient we expend his strength. Evidently the solution of the problem is to obtain the effects of exercise without this expenditure. That it is our ordinary custom to obtain these effects by massage and by electricity I need hardly point out, nor is it my intention to go over the ground already so well covered by Dr. Mitchell and by Dr. Playfair. I have only the following suggestions to make based upon my own experience. It is that these agents be used at first very sparingly and only later in the treatment to their full extent. To this point I shall return in greater detail.

The diet in cases of neurasthenia is of course of prime importance, and upon its proper management will depend as much as upon anything else the result achieved in a given case. You are familiar with the methods ordinarily pursued; with the fact that milk constitutes a large portion of the diet; that the patient is placed habitually upon milk at first and that later on other food is added. The neurasthenic is almost of necessity a dyspeptic he lacks both the desire to eat and the ability to digest food properly. He presents that train of symptoms with which we are all familiar under the name "nervous dyspepsia." Very frequently the patient objects strenuously to the milk, asserting over and over again that he can not digest it, that the milk will be vomited, that it gives rise to pain and so on. The custom under these circumstances is to in some way modify the milk, either by the addition of some diluent, as weak tea or one of the carbonated waters, or peptonized milk, or koumys is administered. Most often, however, you will find that the inability to take milk is very much exaggerated, and my own habit is never to ask a patient the question, "Does milk agree with you?" I simply order it. I am careful, however, to order it in small quantities, beginning with about 4 ounces every two hours and excluding absolutely all other food. This amount is of course insufficient for the needs of the body. I now find, that even if a disgust for milk is present the patient being placed upon a very small amount of food and becoming in a day or two very hungry becomes extremely grateful for the milk and takes it eagerly.

My habit is next to increase the milk very slowly, being careful at first to keep my patient a little hungry all of the time. Finally in the course of a week or ten days, I increase the amount to 8, 10, or even 12 ounces every two hours, as the case may be. If I find that the patient is quite hungry by the fourth or fifth day I add a small slice of stale bread with butter once or twice a day. This I finally permit the patient to have three times daily. The diet is then further increased by a soft-boiled egg, or perhaps by a mere fraction thereof at breakfast. Finally a small chop or steak is given at noon, and a small quantity of thoroughly boiled rice may be given for supper. Upon these beginnings a substantial diet is finally built up, until the patient eats three large meals a day, such for instance as a breakfast of fruit, cracked wheat, one or two soft-boiled eggs, or a good sized steak or several chops, bread and butter, and milk; a dinner of a good slice of roast beef with vegetables and boiled rice (in place of potatoes) for dinner. The supper I prefer leaving as a light meal of bread, butter, fruits, light pudding, and milk. It will be noticed that in this dietary coffee, chocolate, tea, cocoa, are absolutely omitted. Further, that malt extract, cod-liver oil, and beef-tea (all recommended by others) are not used.

My own studies of these cases have convinced me that soups, beef-tea, and broths possess relatively little value, that they simply occupy space which can otherwise be given to milk which certainly has a far higher nutritive power. The same I think holds true of tea, chocolate, and cocoa, while coffee is exceedingly objectionable, inasmuch as the neurasthenic is an individual who has in the vast majority of cases already exhausted stimulants, not only coffee, tea and alcohol, but also the various narcotics, in the vain hope to find relief. I believe that coffee and alcohol even in moderate use should be avoided. Wine, beer, and milk-punch find, therefore, no place in my dietary.

Another element of importance in the treatment is, as Dr. Mitchell and Dr. Playfair have both pointed out, the isolation of the patient. Not only is our patient the victim of a neurasthenia, but in very many instances she is also hysterical, inasmuch as neurasthenia and hysteria are often inextricably intertwined. Under these circumstances isolation, the withdrawal of the patient from the influences of relatives and friends, is of the utmost importance. How deleterious home surroundings are under these circumstances I need not dwell upon, as they have been sufficiently discussed by others. I need only to say that in cases of nervous prostration, which

are sufficiently pronounced to require rest in bed, *isolation is imperative*, and that it should be absolute, no exceptions should be made in favor of any relative, mother, sister, or daughter, nor should any communication ever reach the sick room except through the mouth of the doctor, and then even should be most guarded and most general in character. My experience accords with that of Drs. Mitchell and Playfair, that even slight infringements upon this rule are sometimes followed by the most disastrous results.

We find then that our resources for combating profound neurasthenia comprise rest, artificial exercise (namely massage and electricity), a special diet, and isolation.

The success which attends our efforts in any given case depends largely upon the way with which the various means at our disposal are utilized. No doubt everyone who has essayed the rest cure has developed certain methods of his own which he finds gives him the best results. My own experience has led me to adopt the following: The patient is placed in bed. As a rule she is extremely nervous and perhaps hysterical. Frequently she is a stranger amid strange surroundings. She is left by her friends in the care of a physician whom she knows only by reputation, and of a nurse of whom she knows less. It is my custom, therefore, to begin treatment in the most gradual manner, in order that the patient may become in the first place accustomed to her bed; for lying in bed is in the beginning quite a task to even neurasthenic people, and in the second place, that she may become acquainted with and acquire confidence in her nurse. I, therefore, at the first visit am in the habit of examining my patient thoroughly if I find that the examination is well borne and causes no excitement, but only in part if she be very nervous.

Frequently I do not finish my examination until the next or even the third visit. I simply order a small quantity of milk as already explained and instruct the nurse that she shall give the patient that evening a light and rapid sponge bath, because, in the first place, the patient will have a chance to become a little acquainted with her nurse, and because the bath in most instances favors sleep. Generally I do not direct that massage shall begin until the second or third day, and then I direct the nurse to continue it only for a short time and to make it very gentle and superficial in character. My reasons for beginning the massage in so gradual a manner are, first, that the patient may become accustomed to the touch of the hands of the nurse. Secondly, I direct when I once begin with the massage, that it shall be given in the evening, as the gentle, superficial stroking which I direct to be given at first, soothes the patient. Just as the diet is very gradually increased so should the massage be very gradually increased both in depth and vigor; finally the administration of the massage should be increased to at least an hour. Dr. Playfair recommends that the patient be massed for even three hours. This I do not consider necessary and am indeed doubtful whether anything is gained, if indeed something be not lost by this prolonged rubbing.

Another point which I have come to regard as important is that the massage be performed by the nurse; this, of course, necessitates that our nurse be also an expert *masseuse*. My experience has been that if the patient be treated by a regular *masseuse* at certain intervals in the day, the visit of this third person with whom the patient has also to become acquainted acts as a disturbing factor; to use an everyday expression, the patients are apt to be "upset" by it. In one instance I am satisfied it was the only factor which prevented my achieving a successful result.

Regarding the details of the massage, I do not believe that they are of as much importance as is sometimes believed. The special method or school which the *masseuse* follows has no influence on the general result. In this I am entirely in accord with Dr. Playfair. One practical point, however, suggests itself. As a rule, you are aware a slight elevation in temperature takes place. Occasionally the reverse is the case. A limb that has been rubbed grows cold. In the last instance the nurse should be specially cautioned not to expose the patient's person any more than is absolutely necessary.

Electricity I do not regard as of the same value or importance as massage. In this I am in accord with the writers already quoted. However, it is a remedy which I almost invariably utilize, but generally as follows: In the first place, I believe that almost all that can be gained by artificial exercise can be gained by massage, and we must remember that most patients are excessively afraid of the battery. The average neurasthenic is hysterical, and the mere mention of a battery or the sound of the vibrations of the interrupter will make them very nervous. Sometimes, indeed, marked depression follows its use. However, as in massage, its application must be begun in a very gradual manner. A scarcely perceptible current is at first used, and the nurse, who has been previously instructed in the points of Ziemsen, is made to use the slowly interrupted current in such a way that each group of muscles contract a given number of times. Until the patient becomes accustomed to this often unpleasant sensation, the application may be limited to the forearms and legs. Later it may be applied to the thighs, arms, and trunk. Electricity is, doubtless, a useful adjunct to the rest cure, but it is only an adjunct. At the same time its utility can not be questioned. I never use it early or in the beginning of a case. I am fearful, and in fact such has frequently been my experience, that the excitement and the irritation consequent upon its use act deleteriously upon the patient. Further, the exercise that it gives the muscles I am confident frequently tires and exhausts, and I have observed it several times to retard the increase in weight which otherwise takes place. My habit is to begin with it only several weeks after the treatment has been well under way, and sometimes only in the latter part of a case, preparatory to getting the patient out of bed.

Supposing that our treatment is now well under way, how shall we determine whether we are making satisfactory progress? In the first place, if our patient is taking a large amount of food, and massage is having its proper effect, the color of the patient should improve. The patient should, as the *masseuse* expresses it, "pink" readily under her touch. The limbs, too, should gradually become firmer to pressure. However, another and more important guide than this is the change in weight shown by the patient. Starting with the patient much below normal weight, as many of our neurasthenic subjects are, the changes which the weight undergoes should be our guide. Occasionally it is noticed that in the first few days there is a progressive loss of weight, but soon the patient begins to gain, and in the average case gains rapidly. Patients gain in the course of from eight to twelve weeks as much as 25 or even 35 pounds. I can confirm, from personal observation and personal experience, all that has been said upon this subject by Drs. Mitchell and Playfair. One of my patients actually gained 42 pounds in the course of three months. I have learned to regard the progressive increase in weight as the most valuable index attainable regarding the progress of a case. I consider it of far more value than the persistence or nonpersistence of such symptoms as backache or headache or general nervous feeling. My experience with the various subjective symptoms is that some of them disappear relatively early, others persist, but even the latter, in the majority of cases, grow fainter and fainter until at last they no longer impress themselves upon the consciousness of the patient. In those instances in which obscure subjective sensations seem to be permanent it is not improbable that more or less definite changes "the terminal changes," have taken place and that these persistent symptoms are due to the latter.

It will be noticed that in the above plan of treatment drugs find no place. However, it is occasionally judicious to use a few remedies. Not infrequently, for instance, the indigestion of our patients is complicated by a veritable gastric catarrh. Indeed, I may say that this is, in my experience, more frequently the case than not. I am, therefore, in the habit of prescribing nitrate of silver, say one-fourth of a grain, combined with a fourth of a grain of hyosciamus, to be taken half an hour before meals. Sometimes, also, at the beginning of the treatment we find that the patient's tongue is coated and that the bowels are loaded. In such case I usually prescribe

small doses of calomel and bicarbonate of soda until the desired effect is obtained. In other words, general principles must guide us in the use of medicines in these cases, though, as far as possible, medicines are to be avoided. In a number of cases a laxative of some sort becomes necessary. The choice of this is largely a matter of personal judgment; the simpler the remedy, the better. I myself am in the habit of using the fluid extract of cascara, given at night and, if possible, in gradually diminishing doses.

Occasionally special symptoms require special interference. It may be that the headache is so intense as to demand active interference. In this case I am in the habit of relying upon phenacetene, and sometimes administer moderate doses of bromide of ammonium at the same time. Frequently, too, the insomnia is so profound that it does not yield to the general treatment. We find, however, as a rule that patients who are taking a large amount of milk sleep a great deal. The excess of food seems to have a soporific or sedative influence, and therefore narcotics are rarely indicated. The massage, too, if given in the latter part of the day, favors sleep. Sometimes, though not always, a wet sheet followed by a gentle rubbing, or a hot sponge bath rapidly given, act as sedatives. Occasionally, however, insomnia is so profound that we are driven to the use, for a time at least, of drugs. The milder drugs, say small doses of sulphonal, possibly of bromide, should be given. The stronger narcotics should practically never be used. Fortunately in the average case we can get along without them.

It will be noticed that strychnia and arsenic, so much vaunted in neurasthenia, are drugs rarely used by myself. They are distinctly stimulants and should, therefore, on general principles, I believe, be avoided. In a large number, perhaps the majority of cases, the treatment can be conducted successfully from beginning to end without the use of any other drug than an occasional laxative.

Let us suppose now that our patient is progressing favorably; she is gaining steadily in weight; the tissues are becoming firmer; the annoying subjective symptoms are disappearing; when are we to get her out of bed? How are we to know when the maximum amount of good has been obtained by the method pursued? In neurasthenic cases of long standing it is probable that our best guide is the change shown by the body weight. If a decided increase has taken place and it then ceases, it is probable that the maximum increase has been reached, i. e. the maximum increase possible under the treatment. If at the same time our patient's symptoms have become progressively less and less, we have probably reached a period when the patient should be gotten out of bed. In young neurasthenics, however, and in others in whom neurasthenia has not lasted for so long a time, it is probable that the increase in weight is not of itself a sufficient guide, inasmuch as they will sometimes continue increasing in weight until they become needlessly fat. In such cases we are to consider whether the body weight is about normal to the height of the individual, and whether a normal body weight has therefore been reached. If at the same time the neurasthenic symptoms are disappearing, we may consider that it is about time for our patient to be gotten out of bed. In getting her out of bed, we must remember that, though well nourished, she is weak. We must remember that though the muscles have been thoroughly rubbed, and though they have been toned up by the battery, the patient has not exercised for weeks and months. She is in the condition of having accumulated an enormous amount of latent energy.

This energy must now be mobilized, made potent by gradual exercise. The patient is allowed, for instance, to sit up for five or ten minutes in a day. While in bed passive movements of the legs and arms are made. Gradually the length of time for sitting up is increased, so that the patient sits up twenty minutes to forty-five minutes or an hour a day. Little by little the time is increased, until at the end of ten days the patient is up from four to six hours. Passive movements, which until now have been made by the nurse, are now dispensed with. For them light calisthenics are substituted. The patient is also made to walk about her room a little. Finally a short walk out of the house or a carriage ride follows. Next

comes a trip to the seashore for some ten days or three weeks. During this time the patient is made to exercise in the open air. As a rule she walks a little at first, but gradually increases the amount until 2 or 3 miles at a brisk gait is attained. The massage is little by little discontinued, and during the stay at the seashore occasional immersion in a hot salt-water bath, say twice weekly, is ordered. I say immersion because a prolonged bath in some patients will be followed by a sense of fatigue rather than exhilaration.

During this time, also, the patient is guarded against any sudden excitement. However, she is gradually permitted to renew her relations with her relatives and friends. Finally she is returned home, and in order to insure against a relapse, which under proper precautions rarely occurs, she is told to spend some ten hours in bed out of the twenty-four, to still take her breakfast in bed, and to still keep up a moderate quantity of milk in addition to her regular diet. Daily exercise is also insisted upon. These precautions are not absolutely necessary. At the same time they insure care on the part of the patient and also impress the relatives and friends of the patient that the latter is not yet to be subjected to the strains of social and domestic life. Little by little the patients break in upon the rules laid down by the physician at parting, and in the course of a number of weeks adopt the lives of the people about them. I have had the opportunity of tracing some of these patients for a number of years after a prolonged course of rest-cure and have never met with a relapse in a case in which the patient had devoted a sufficient length of time to the treatment. My experience is that although some patients make excellent progress in six weeks and even seem able to return to their friends at the end of that time, that these cases are prone to relapse, that the recovery is not a durable one. Time is therefore a necessary element in achieving a more or less permanent result. I always prefer to give the patient the benefit of from ten to twelve weeks, and in some cases even longer. Exercise, also, is a necessary element in maintaining the increased level of health. A return to the previous habits of life, often habits of indolence and dissipation, are of course dangerous to the continued welfare of the case. One of the marked benefits accruing from the rest-cure is the fact that the patient is placed, and perhaps for the first time, under a rigid discipline, a discipline, too, which leaves its impress upon the whole after life and absolutely modifies for the better the previous way of living.

As already stated in the body of this paper, the rest-cure permits of several modifications, and as a rule some modifications must be made when the patient is a man. Men take less kindly to their beds, and frequently, too, the patient is the breadwinner of the family, and to withdraw himself absolutely from his business is an impossibility. In these cases an application of the general principles of rest and diet as laid down above will be found of great service. However, if the case be one of profound neurasthenia little can be accomplished unless the rest-cure be carried out rigidly in all its details. I will not allude to the part which exercise plays in the treatment of the milder cases of neurasthenia, as it is somewhat foreign to the topic of this paper. My experience, however, has been that in cases in which the neurasthenia is well marked the exercise had better be of a limited character and carried on under the eye of the physician, or of a professional physical instructor. Violent or severe exercise, it is hardly necessary to say, invariably does harm. It is surprising, however, to what an extent the exercise can be increased if it be begun gradually, and this I need hardly say applies not only to the treatment of the milder cases of neurasthenia, but also to the "after-bed" treatment of the more severe cases.

Much might be added to the above remarks regarding the qualities which it is necessary that a nurse should possess in order that the rest-cure may be successfully carried out. Much time might also be spent upon the discussion of the use of such adjuvants to treatment as hydrotherapy. I prefer, however, to close my paper at this point, preserving the above topics for some future occasion.

ALGUNOS DATOS FARMACOLÓGICOS ACERCA DE CATORCE PLANTAS MEXICANAS.

Por el Dr. FERNANDO ALTAMIRANO.

He querido contribuir con mi humilde contingente dando á conocer á esta honorable asamblea los resultados á que varios profesores mexicanos han llegado en el estudio de algunas plantas. Acerca de todas ellas he reunido lo que se ha hecho en el Instituto Médico Nacional de su clasificación botánica, composición química y acción fisiológica, dando además de la mayor parte de dichas plantas, los usos terapéuticos que parecen más fundados. He cuidado de citar á cada autor al calce de cada resultado inscrito por mí. Ojalá que la lectura de este trabajo pueda tener algún interés para el ilustrado personal del Congreso Panamericano.

BOCONIA ARBÓREA, WATSON. PAPAVERÁCEAS.

En Michoacán se le conoce con el nombre de Inguande, en Morelos con el de Llorasangre y en Córdoba con el de Gordolobo. Abunda particularmente en Michoacán cerca de Uruápam y de Tingambato. Se usa la corteza. Encierra un jugo amarillo que contiene los principios activos.

Composición química de la corteza.

[Profesor M. Lozano, 1893.]

Agua	10.000	Dextrina	5.775
Sales	9.500	Ácido oxálico y tártrico	2.430
Grasa	1.320	Ácido	
Resina ácida	9.364	Materias colorantes	
Alcaloide (boconina)	5.116	Celulosa y leñosa	44.990
Goma	1.875	Pérdida	9.620

Al alcaloide se le llamó Boconina por el Sr. Lazo de la Vega, quien hizo un análisis de la corteza. Lo que se ha llamado Boconina es una reunión de varios alcaloides. Se han indicado cuatro por el mismo Profesor Lozano. Uno lleva el nombre de Boconirubina, otro el de Boconixantina, el tercero Boconiclorina, y el cuarto Boconiiodina, nombres debidos á la coloración que desarrollan los alcaloides por la acción del ácido sulfúrico concentrado, que es roja para el primero, amarilla para el segundo, verde para el tercero y violada para el cuarto. Además, las sales del primero son rojas, las del segundo amarillas, las del tercero y cuarto blancas; todas esas sales son cristalizables.

Acción fisiológica.—La experimentación se ha llevado á efecto con la boconina, esto es, la mezcla de tres alcaloides. Los efectos principales, encontrados hasta hoy, son que produce anestesia de las placas terminales nerviosas del lugar en que se inyecta, y después la de los centros nerviosos, que provoca la dilatación vascular favoreciendo así la producción de hemorragias, y que determina perturbaciones cerebrales ligeras sin privar de la inteligencia. Cuando se administra el polvo de la corteza por la vía gástrica provoca efectos vomipurgantes, que deben atribuirse á principios resinosos. Se ha aplicado con buen éxito para producir la anestesia local en varias operaciones quirúrgicas.

CACALIA CERVARIÆFOLIA, D. C. COMPUESTAS.

Vegeta en Chihuahua. Se le llama Matarique, que significa mata-dolor. Se usa la raíz. Es muy olorosa, de sabor amargo, y en su quebradura presenta de especial una zona de puntos resinosos amarillos.

Composición química.—Resina, esencia, glicosida, tanino, glucosa, alcaloide.

En la rana, la dosis de 0.10 de extracto hidro-alcohólico produce la parálisis de los músculos voluntarios, disminuye la sensibilidad y paraliza el corazón. En el perro, 0.50 del mismo extracto por inyección intravenosa produce analgesia en general, abatimiento de la energía cardiaca, y trastornos respiratorios, todo lo cual desaparece á las dos horas. En el hombre 30 gramos de tintura producen vómitos, dolores intestinales, evacuaciones, calambres y aún accidentes lipotímicos. Al exterior en fomentos ó fricciones, calma las neuralgías, mitiga los sufrimientos que causan las escoriaciones y quemaduras, y favorece la cicatrización de las heridas por sus cualidades antisépticas. Se ha aplicado para combatir las dispepsias pútridas, la constipación y meteorismo intestinal. Su principal aplicación es como vulnerario y para calmar los dolores reumáticos musculares ó articulares, segun observaciones del Dr. Ceballos, médico del Asilo de Ancianos. Dosis: de 15 á 30 gramos de tintura al interior. Hay que vigilar sus efectos sobre el corazón. Al exterior en las heridas se usa una mezcla de 20 gramos por 100 de agua para lavatorios antisépticos.

CALEA ZACATECHICHI, SCHL. COMPUESTAS.

Zacatechichi, su nombre vulgar, indica yerba amarga. Es en efecto muy amarga y se usa para combatir algunas afecciones del estómago. Vegeta en Córdoba y Orizaba, del Estado de Veracruz.

Su composición química es la siguiente: Clorófila, materia colorante, aceite esencial, resina ácida, un ácido volátil, principio amargo (parte activa), tanino, sales. (Dr. Armendáriz.)

Terapéutica.—Se ha ensayado en los hospitales, en las dispepsias, catarros gástricos, anorexia, diarreas atónicas, etc., con buenos resultados. Aumenta el apetito, facilita la digestión y combate la constipación. Dosis: El cocimiento en la proporción de 5 por ciento, el extracto 1 gramo en veinticuatro horas y la tintura hasta 4 gramos.

CALLIANDRA GRANDIFLORA, BENTH. LEGUMINOSAS.

Pambotano, Xoloxochitl, Cabellitos. Vegeta en Veracruz, Morelos, Michoacán, valle de México. Se usan las raices, que son rizomas vivaces, fasciculadas, torcidas, fibrosas, leñosas, de sabor acre especial, que persiste en la faringe masticando, aún que sea una partícula de la parte leñosa.

Composición química.—Materias grasas: Cera, esencia, tanino, resina, materia colorante roja, glucosida.

El cocimiento y el extracto no producen ningún fenómeno notable en las ranas ni en el perro, sea que se administre por la vía gástrica ó por inyección subcutánea, por una sola vez, ó por varios dias consecutivos. En el hombre se ha ensayado en numerosos casos de impaludismo sin haberse llegado á comprobar que quitara los accesos. Jamás se llegó tampoco á producir la desaparición de los microzoarios de Laveran. En vista de lo anterior no se debe tener confianza en esta droga para combatir las intermitentes graves, aún cuando goza de gran reputación de antiperiódica en el público. Podría servir en un impaludismo crónico, combatiendo las diarreas y perturbaciones gástricas, por sus calidades antisépticas. Se usa el cocimiento: 60 gramos por 500 de agua. Se hierve hasta reducción de la tercera parte. Una larga ebullición es necesaria para conseguir la disolución de los principios extractivos.

CORIARIA ATROPURPÚREA, D. C. CORIARIEAS.

Tlalocopetate. Se encuentra en abundancia en Amecameca del Estado de México. Es venenosa y sus frutos ocasionan todos los años accidentes tóxicos graves en los niños del campo.

Composición química de la planta.—Agua, grasa, resina, tanino, ácido gálico, materia colorante amarilla, coriamirtina (principio activo), sales. (Río de la Loza.)

La coriamirtina es sólida, blanca, cristalizada en prismas exagonales alargados. Poco soluble en el agua fría y muy soluble en el alcohol, éter y cloroformo. El ácido sulfúrico la colora primero en amarillo descomponiéndola y dejando depositar una materia blanca pulverulenta; el ácido iodídrico es descompuesto colorándose en amarillo claro. Los álcalis fijos y volátiles coloran las soluciones en rosa, que pasa al amarillo.

HECHTIA GLOMERATA, ZUCE, Y H. ARGENTEA, BAKER. BROMELIÁCEAS.

Nombre vulgar: Guapilla. Abunda en San Luis Potosí, Querétaro, la Mixteca, etc. Cubre grandes extensiones de terrenos, sobretodo rocallosos. Se usa por los campesinos como emoliente, como alimento y para curar la pulmonía y bronquitis crónicas. En la base de las hojas sobre ambas caras hay una substancia amarilla extendida como un barniz. Frotando ó plegando la hoja se levanta ese barniz en laminitas delgadas, adhesivas constituidas por un bálsamo cuya composición es la siguiente:

Composición química del producto llamado guapilla ó cera vegetal.—Aceite esencial, 2.600; ácido benzoico, 5.733; resina ácida, 79.267; resina neutra, 2.100; goma, 0.040; sales minerales solubles en el agua, 1.360; sales minerales insolubles y pérdida, 8.800. (Armendáriz.)

Este producto natural, según su composición química, se clasificó como un bálsamo análogo al de benjuí, pero formando una nueva especie, que por ahora llamaremos benuí de bromelias. Toca al Dr. Armendáriz haber señalado el primero la composición y naturaleza de este producto notable.

Sus propiedades son: Color amarillo verdoso, aromático, algo dulzón, blanco, susceptible de amoldarse con los dedos; punto de fusión, 72°, centígrado; inflamable, produciendo llama rojiza humeante y desprendiendo olor de benjuí. Densidad, á 18°, centígrado, 1183. Soluble en el éter sulfúrico, alcohol absoluto, en una mezcla de cloroformo y alcohol; casi insoluble en el agua, en el éter de petróleo, en la benzina, en el sulfuro de carbono y en el alcohol á 50°. (Dr. Armendáriz.)

El ácido nítrico lo colora en verde obscuro, el sulfúrico en verde que pasa al azul violado; los alcalinos lo disuelven con coloración rojiza. El ácido benzoico se llegó á extraer solamente sublimado el producto resinoso en presencia de álcalis y agua. Por vía seca no se obtiene dicha substancia. Sus aplicaciones se desprenden de su composición. Podría substituir á los bálsamos de benjuí, etc. Se llegará á obtenerlo á bajo precio, por la abundancia que hay de la planta productora.

ERYTHRINA CORALLOIDES, D. C. LEGUMINOSAS.

Al árbol se le llama Tzompantle y á las semillas colorines ó patoles. Vegeta en el valle de México y en otros muchos lugares. Se le cultiva como planta de ornato en casi todos los pueblos. Se usa la madera en la fabricación de tapones para botellas. Las flores en la alimentación. Las semillas, de color rojo, son venenosas.

Su composición es la siguiente: Agua, 7.15; grasa, 13.35; resina soluble en el éter, 0.32; resina soluble en el alcohol, 18.47; alcaloide, 1.61; albumina, 5.60; goma, 0.83; ácido orgánico, 0.42; fécula, 15.87; sales minerales, 89.15; pérdida, 0.68. (Professor Río de la Loza.)

Composición química del extracto llamado eritrina.—Nombre de los componentes y su clasificación fisiológica: Coraloidina, convulsivante; coralina, inerte ó poco activa; eritroidina, paralizomotor enérgico; ácido erítrico, inactivo; eritro-resina, emética; principio, inactivo; grasa, inactiva; glucosa; materia colorante; sales minerales; resina. (Dr. F. Altamirano, trabajo leído en la Academia de Medicina en julio 27 de 1887.)

La acción fisiológica se reasume al enumerarse los componentes. Se puede agregar que tres son las calidades principales del extracto: (1) Paralizar las placas terminales de los nervios motores; (2) provocar convulsiones; (3) provocar vómitos.

Aplicaciones.—Por sus principios paralizantes se recomienda en el tétanos, mal

epiléptico, la corea, etc., y como medio contentivo fisiológico. Por sus propiedades excitantes no tiene aplicación alguna. Por sus propiedades eméticas como vomitivo seguro en los animales y con especialidad en las aves.

GAULTHERIA OVATA, D. C. ERICACÉAS.

Nombre vulgar: Axocopaque. Vegeta abundantemente cerca de Huauchinango, Orizaba, y Jalapa. Toda la planta es muy aromática por lo que se usa actualmente para perfumar los templos y las habitaciones. Los antiguos mexicanos usaban las hojas para perfumar la ropa y preservarla de la polilla. Les servía también para curar varias enfermedades, dándola á los enfermos en bebida teiforme. Contiene 20 por ciento de aceite esencial, que se puede considerar como el principio activo, análogo á la esencia de *wintergreen*, que se extrae de la *Gaultheria procumbens*, planta de los Estados Unidos del Norte. Sus propiedades antisépticas, diuréticas, vulnerarias y antireumatismales la recomiendan á los prácticos. Se aplica especialmente á los niños atacados de reumatismo con el fin de evitarles los inconvenientes del salicilato de sosa. Como antiséptico el principio esencial es tan eficaz como el ácido salicílico y el fénico sin ser tóxico. Es de preferirse para la antisepsia de las mucosas, heridas extensas y anfractuosas, etc. La infusión teiforme es la preparación más usual. Se prepara en la proporción de 10 por ciento; es agradable, y el estómago la tolera por largo tiempo.

MONTANOA TOMENTOSA, LLAV. ET LEX. COMPUESTAS.

Zihuapatli, nombre azteca, que significa medicina de mujer. Es muy común en toda la República. En el valle de México abunda. Se usa el cocimiento de las hojas para provocar las contracciones del útero.

Composición química.—El Dr. E. Armendáriz ha demostrado recientemente los componentes que siguen, de los cuales el Profesor Federico Altamirano había encontrado el principio activo, que es el ácido montanoico: Resina ácida, 2.140; resina neutra, 3.026; clorófila, 27.500; ácido orgánico (montanoico), 1.560; cera vegetal, huellas; goma y principios, 2.015; tanino, que colora en verde las sales de fierro; agua, 11.500; sales minerales, 12.560; celulosa y leñosa, 22.824; materia extractiva, 10.110; aceite esencial y pérdida, 4.705.

Al ácido montanoico se considera hasta ahora como el principio activo de esta planta que produce la contracción uterina.

Acción fisiológica.—Se absorbe por el estómago el cocimiente de las hojas, y produce fuertes contracciones uterinas. El ácido montanoico en inyección subcutánea provoca dolores intensos en el lugar inyectado y la contracción de los vasos capilares. La dosis para este efecto es de 0.10 y no produce accidentes tóxicos. Su acción vaso constrictiva es análoga á la del cuernecillo de centeno. Se diferencía en que el zoapatli produce con especialidad más bien las contracciones del útero que las de los capilares para detener las hemorragias. Podría decirse que el zoapatli hace contraer al útero y no á los vasos, el cuernecillo al útero y á los vasos y el hidrastis á los vasos y no al útero. La comelina obra como el hidrastis.

Indicaciones.—Para aumentar la energía de las contracciones del útero grávido y violentar el término de la involución uterina.

PSORALEA PENTAPHILLA, LINN. LEGUMINOSAS.

Contrayerba de Querétaro. Contrayerba blanca ó aromática. Vegeta en Querétaro, Guadalajara, Guanajuato, etc. Se usa la raíz. Esta es tuberosa, leñosa, rugosa, flexuosa, de 4 á 8 centímetros de ancho y de largo, de color café al exterior, blanca al interior, muy feculenta, de olor especial. Goza de gran reputación entre el vulgo, como antiperiódica (y para calmar los dolores de dientes).

Composición química.—Agua, 10.000; sales, 3.750; grasa fusible á 60° centígrado, 1.880; ácido cristalizable, 0.400; alcaloide (psoralina y glucosa), 0.250; goma, 6.86;

glucosa, 1.440; almidón, 26.500; albumina, 0.100; celulosa y leñosa, 28.750; pérdida 6.154. (M. Lozano.)

Psoralina: Alcaloide descubierto por Lozano, blanco, cristalizado, soluble en el agua y en el alcohol, insoluble en el éter sulfúrico, en el cloroformo y en la benzina; de olor aromático parecido al de la raíz y de sabor amargo. Precipita con los reactivos de los alcaloides. El ácido sulfúrico le hace tomar un color violado que pasa al verde y luego al azul de Prusia; el ácido nítrico produce coloración verde-claro que pasa al rojo bajo la acción del cloro y del amoniaco.

Fisiología.—En las palomas la psoralina provoca por inyección hipodérmica en la dosis de 0.25 á 0.50 vómitos, abatimientos de la energía muscular y descenso de la temperatura, por lo que puede considerarse como emética y antitérmica (Dr. Altamirano, 1889). Tesis inaugural del Professor Lozano. Según los experimentos del Dr. Toussaint en el Instituto Médico Nacional, resulta que es realmente antitérmica, la psoralina, por acción directa sobre los centros nerviosos.

Terapéutica.—Aunque muy recomendado por el vulgo como excelente antiperiódico, el Dr. Terres en su servicio del Hospital de San Andrés no ha llegado á comprobar esos efectos. Se ha demostrado que abate la temperatura febril 1° á 2° en una hora, persistiendo el abatimiento como dos horas. La dosis empleada ha sido de 0.016. Es pues la psoralina un buen antitérmico preferible por no tener acción tóxica.

ROUREA OBLONGIFOLIA, HOOK. ET ARN. CONARACÉAS.

Se le llama chilillo de la Huasteca. Vegeta en la Huasteca Potosina, en Motzorongo (Estado de Veracruz), etc. Es una liana que trepa sobre los árboles á grandes alturas. Los cojolites (*Penelope purpurascens*, Wagl.) se alimentan con sus frutos, y según se dice los huesos de estas aves se vuelven venenosos para los perros. Aún no comprobamos esta particularidad. Se usa la raíz para envenenar á los perros y también como curtiente por la gran cantidad de tanino que encierra la corteza.

Composición química.—Según un ensaye del Dr. Codoy, contiene: Grasa, materia colorante amarilla, resina soluble en el alcohol, resina insoluble en el alcohol, tanino en abundancia, principio amargo, glucosa, goma, principios diversos.

Acción fisiológica.—La dosis de 4 gramos de polvo de la corteza administrada á un perro por la vía gástrica provoca convulsiones clónicas generales (temblores), paralisis de los cuatro miembros, respiración difícil, dilatación pupilar. Estos síntomas aparecen lentamente en tres ó cuatro dias y persisten mucho tiempo, particularmente la paresia motriz. En la rana produce también la parálisis del movimiento y trastornos cardiacos. (Altamirano.) Nuevos estudios nos harán conocer su modo de obrar en diversas enfermedades. Actualmente se usa: 1° Como veneno para los perros; se les da el polvo de la corteza mezclado con carne. 2° Como curtiente.

SENECIO EHREMBERGIANUS, T. W. KLATT. COMPUESTAS.

Yerba de la Puebla, Izcuinpatli. Vegeta en Puebla, Zacatecas, Guanajuato, etc. Se usa toda la planta. Es venenosa y se utilizan sus propiedades para matar á los perros. Se les da el polvo oculto en un fragmento de carne y mueren como á las dos horas de haberlo comido.

Composición química.—Agua, grasa, resina, goma, ácido senécico (principio activo), sales. (Río de la Loza.)

Propiedades del ácido senécico: Líquido, incoloro, inodoro, insípido, muy soluble en el agua, el alcohol y éter sulfúrico. Reduce en caliente las sales de plata, oro, licor de Fehling, etc. No precipita por el percloruro de fierro, ni cloruro de bario, de calcio, agua de cal, sulfato de magnesia, etc. Reduce al bicloruro de mercurio precipitando calomel. No da ninguna coloración en los ácidos concentrados. Forma fácilmente senecatos por saturación ó por descomposición de los carbonatos. Los senecatos alcalinos son delicuescentes. Con el ácido acético y una base forma

aceto senecatos muy facilmente cristalizables. Esta combinación será la más appropósito para las formas farmacéuticas.

Fisiología.—El aceto-senecato de barita produce la muerte á un perro en la dosis de 0,40 por inyección subcutánea, después de tres horas.

THALAUMA MACROCARPA, ZUC. MAGNOLIÁCEAS.

Yoloxochitl, flor del corazón, como se le llama también. Vegeta en el Estado de Morelos, pero principalmente cerca de Motzorongo, en el Estado de Veracruz.

Composición química de las semillas.—Grasa, resina ácida, resina indiferente, aceite esencial, materia colorante, extractivo amargo, talaumina, un glucosido resinoso, sales. (Dr. Armandáriz.)

Fisiología.—Lo que por ahora se puede inferir de las experiencias practicadas es que el extracto de las semillas altera los glóbulos rojos poniéndolos negruzcos, provoca fenómenos asfíxicos, modifica las pulsaciones cardiacas y la tensión de la sangre y da orígen á diversos fenómenos dependientes del sistema nervioso. La muerte es producida por parálisis cardiaca. (Altamirano.)

Terapéutica.—Es muy usada la tintura preparada con las flores, contra las palpitaciones nerviosas. Actualmente se ensaya en los hospitales.

THEBETIA YCCOTLI, D. C. APOCINÁCEAS.

Esta apocinea se conoce vulgarmente con el nombre de Codo de fraile ó Yoyote. Vegeta en Morelos cerca de Jojutla, Michoacán, etc. La parte usada es la semilla, que contiene las principios siguientes como más importanes: Grasa, tebetosa (glucosida).

La tebetosa es el principio activo glucosida muy venenosa, cristalizado en láminas incoloros, brillantes, de sabor acre. Adormece la lengua é irrita enérgicamente la mucosa nasal. Soluble en el agua. Muy soluble en el alcohol y poco en el éter sulfúrico. La tebetosa se transforma en teberesina bajo la influencia de los ácidos. La teberesina reduce al licor de Fehling.

Acción fisiológica.—Se absorbe fácilmente por las vías gástrica y subcutánea. Su acción principal la ejerce sobre el corazón. En el perro, la dósis de 3 milígramos provoca á los quince minutos de ingerida, irregularidades en los latidos, aumento exagerado de la tensión sanguínea, vómitos, salivación, contracción traqueal y tal vez bronquica, movimientos respiratorios frecuentes, superficiales y fenómenos asfixicos. En fin como á los cuarenta minutos parálisis del corazon, abatimiento de la presión sanguínea. No provoca diuresis. El corazón se detiene en sístole. En el corazón de la rana se observa que antes de detenerse pasa por un período de parálisis ó relajamientos parciales de las paredes ventriculares.

La terapéutica clínica está por hacerse. Puede clasificarse como emeto-catártico y paralizomotor cardiaco. Parece contraindicado en las afecciones cardiacas mitrales particularmente.

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ADDRESS BY THE EXECUTIVE PRESIDENT, JOHN B. HAMILTON, M. D., LL. D.

Colleagues: For the first time in the history of the American continent the medical men of the Americas meet in convention for the purposes of scientific advancement and the cultivation of closer professional relationship.

The country of Washington, the land of Bolivar, and the sunny islands of the Southern seas have sent their representatives to this capital of their oldest Republic to exchange courtesies and set forth a fair statement of their degree of enlightenment in the various branches of medical knowledge.

Our statesmen have long desired this close union between the American Republics, and the medical profession now, as ever, stand ready as citizens to carry out their share of this patriotic duty. After our own civil war, the medical profession, through the American Medical Association, met in annual reunion at Atlanta; and it should always be a matter of professional pride that our own led the van in this march of professional and social reunion. Here again we are inaugurating the first of what we hope may be the beginning of a series of Pan-American professional congresses, each more interesting than its predecessor, and all serving to unite our glorious lands in common aims and mutual regards.

As the United States has had the honor of proposing the congress, the burden of organization has fallen largely upon its representatives, and the overflowing programme is to-day evidence of the faithfulness with which our president, our secretary-general and their coadjutors have performed their task.

We welcome you, dear colleagues, to a rare treat in the republic of letters; our foremost medical men will address you, and the topics they bring for your consideration have living interest, for they are topics of to-day.

A glance at our programme shows that our own section, notwithstanding the subdivisions by which many branches of surgery have been organized into separate sections, is ample to fully occupy the time set apart for our deliberations.

The rapid evolution of surgical knowledge is one of the wonders of this remarkable age, and surgeons may fairly claim that their own branch of medicine has kept equal pace with the stupendous advances made by the collateral sciences. A review of the surgical progress of the last decade alone constitutes one of the most brilliant pages of the history of medicine. And yet one must remember that all scientific progress is based on antecedent fundamental facts discovered by slow, laborious, and painful steps.

The labors of Darwin, Huxley, Herbert Spencer, Pasteur, and Lister in the last decade have made possible the practical successes in the present decade.

There is at this time no diseased organ or tissue of the body that escapes the remedial scalpel, and an examination of the discussions of this time shows that the questions presented are rather those of method than those of original discovery. We no longer question the propriety of surgical interference in hitherto dark por-

tions of human anatomy, but we are concerned in the technique of that interference; and to the improvement of surgical technique the ablest minds of the present decade have been directed.

The subject of surgical bacteriology, which includes the chemical study of microbic products, has still much to disclose, but we already base our practice on the immortal discovery of Pasteur. The success of modern surgical treatment, even with the imperfect knowledge of the bacteria that we now possess, is such that no surgeon thinks for a moment of comparing the results of any given operation with those obtained in the pre-microbic epoch. This comparison, however, only relates to the age of gunpowder, for history tells us with abundant detail that the ancient treatment of wounds corresponded very closely with our own. The vulnerary compounds of the ancients were largely composed of what we know as antiseptics; the terebinthinate and metallic dressings of the Alexandrian Period we can accept to-day as true antibacillary agents; and even the boiling oil and the red-hot iron we could now admit as forming an eschar or impermeable wall against the entrance of microbes. It was aseptic surgery of which the ancients knew nothing. The empirical results of the boiling oil, of the actual cautery, were enough for the ancient masters; like the heroes of Balaklava,

"Theirs not to reason why."

They only knew results were satisfactory; wounds healed quickly and without sepsis; what matter if the theory on which their treatment was based—that of arrest of hemorrhage—was faulty, the result satisfied them. Like the blind man of the New Testament, the logic was simple: "Whereas I was blind, now I see;" therefore the touch was adequate. All medical science seems to have run in cycles, and there was less medical superstition in the Alexandrian Period than in mediæval medicine—less in the Hindoo charaka than in the pages of Guy de Chauliac or Ambroise Paré. Bacteriology has added much to our knowledge of tuberculosis, and given more precision to its treatment, but that knowledge is still imperfect, and its treatment far from satisfactory. Much less has bacteriology added to our knowledge of the carcinomata, which still remain one of the mysteries of medicine. We have for years studied the varying departures of tissues from the normal to the abnormal type, and bacteriologists have in vain sought to connect the atypical structure of carcinoma with some bacterial development, but no Pasteur or Harvey has yet dawned upon our horizon to pick the lock of a mystery to which Heaven seems to have allowed our generation no key. Looking to the future we can not doubt that the solution of the formation of the carcinomata will yet be discovered, but it will necessarily be through the influence of some now totally unknown factor. The study of embryology and atavism seems at present the most probable avenue to the truth.

What may we hope for the future of surgery?

It seems likely at this day that improvements in technique will continue to occupy the surgical mind until some epoch making discovery in physiology shall have been made. It is not likely that the present generation of surgeons will witness another discovery as far reaching as that of Pasteur. We must digest and fully assimilate the discoveries of the bacteriological epoch; that process will probably fully occupy our time and that of our immediate successors. It is true that we may have some help from advances in the collateral sciences; transillumination of the body, for example, may be yet fully developed in our time, instruments of precision as aids to hearing and vision may greatly assist us in making our present knowledge useful, but the great outlets to human life, such as carcinoma, in all probability will have their genesis understood only by the surgeons yet unborn. When that time shall come carcinoma and tuberculosis will be classed among the preventable diseases. These two affections have cost more human lives annually than cholera or yellow fever, and yet no government has ever set on foot any systematic and regular inquiry

into their causation or propagation. It is true that the study of cattle tuberculosis has been the subject of much study by the Bureau of Animal Industry, but so far as the human race is concerned little has been done in the direction indicated.

Colleagues, I feel that I have too long detained you with these speculations, when we have before us a programme so rich and so varied, but I can not refrain from expressing my heartfelt congratulations on the success of this meeting, my thanks for your generous response to the call for papers, and as an American surgeon to bid you welcome. Welcome, thrice welcome, foreign colleagues, to our hearts and homes. We pray you to kindly join us in warmest fraternal greetings to our European guests, and let us remember the saying of Livy that true friendships are immortal.

PAPERS READ BEFORE THE SECTION.

TWO CASES ILLUSTRATING THE VALUE OF GASTROSTOMY FOR THE EXPLORATION OF THE CARDIAC EXTREMITY OF THE STOMACH.

By ERNEST LAPLACE, M. D.,

Professor of surgery, Medico-Chirurgical College, Philadelphia, Pa.

The following case illustrates the benefits to be derived by immediate operation for the relief of symptoms in spite of the desperate nature of the present condition. Gastrostomy for the relief of an æsophageal stricture has gotten the reputation of a forlon hope, or a last resort, and though this may properly be the case when the stricture is of a cancerous nature, still, owing to the impossibility of a positive diagnosis, it may happen, as in the following case, that other causes may produce the stricture, which, if the patient could successfully be tided over a crisis (the causes) might subside and the patient be restored to health.

Case 1.—J. H., aged 54, had been healthy all his life until he gradually noticed a difficulty of swallowing, which was soon followed by vomiting whenever an attempt at swallowing was made; finally was unable even to swallow water. No stomach tube of any size could be introduced past the stricture, which was diagnosed at the cardiac extremity of the stomach. No cancerous history, no possible clew as to the nature of the obstruction. On entering the hospital the patient was in a starved condition, having been fed by enema for three months. Although very weak—almost exhausted—we determined to perform a gastrostomy.

Incision was made on the right side 3 inches in length parallel to the costal arch, starting about half an inch from the ensiform cartilage. Opening the peritoneum we fell upon a hard, glistening mass which we recognized as the stomach only by the attachment of the omentum. Having had considerable difficulty in assuring ourselves that it was the stomach, we sutured this substance to the abdominal wall by 12 silk stitches, leaving an exposed surface of the stomach about three-fourths of an inch in diameter. On the third day this was punctured with the thermo cautery, and a sound was introduced into the stomach, which was found quite thick and strongly contracted. The patient was fed through this opening with peptonized milk, custards, etc. In a few days the stomach had dilated to a considerable extent, and then the patient, craving for food, was allowed to chew his food, and the mass was then introduced into the stomach through the opening.

No difficulty was found in withholding the contents of the stomach, for a plug, consisting simply of an India-rubber nipple, such as is used in ordinary feeding bottles, was introduced into the opening and remained in position at the hour-glass portion of it. The patient rapidly increased in weight and regained perfect comfort, when, to our surprise, he became able to swallow liquids, and gradually to swallow food, through the œsophagus.

Having apparently regained perfect health we determined to close the fistula in the stomach. The patient was anæsthetized, and, being very anxious to know what could possibly have produced the original stricture, we introduced two fingers into

the stomach toward the cardiac extremity and found a pediculated mass hanging in the stomach

This was rather high up and out of our reach. The obstruction to the œsophagus must evidently have existed at the time that the growth started. This growth is evidently a polypus which started about the cardiac extremity of the stomach as a sessile growth large enough to completely obstruct the orifice, but on further development becoming pediculated, gravitated into the stomach, leaving the œsophageal tract open. The patient at the present writing is feeling perfectly well, and still retains this growth within the stomach which at present seems to afford him no annoyance.

We should not wonder but that it will eventually be digested by the stomach, should its pedicle become long enough to allow it to hang on the floor of the stomach. Should it, however, offer him any discomfort he has promised to return for its extraction, which operation will offer no difficulty, as it will only require a cut over the original cicatrix, and ligating the pedicle the tumor will be easily removed.

Case 2.—A. H., aged 52 years, a miner by occupation, and a sufferer from tertiary syphilis, gradually lost the power of deglutition. He was otherwise in a fairly good condition. On examination the æsophageal sound of smallest caliber could not pass through the cardiac portion of the æsophagus. There was great emaciation, and for the relief of the progressive starvation gastrostomy was resorted to. The operation was performed at two separate sittings. At the first the stomach was attached to the abdominal wall as in the previous operation; at the second the stomach was opened with the thermo-cautery knife. The patient chewed his food and it was then inserted into the opening of the stomach. The opening was at first plugged with iodoform gauge, and subsequently the India-rubber nipple was used for that purpose. After two weeks the emaciation had considerably disappeared, and the opening in the stomach had enlarged to the size of a 5-cent piece. No apparent change had taken place in the patient's power of deglutition, although he was given the mixed specific treatment by the stomach. It then occurred to me that I might introduce the sound through the opening into the stomach up the cardiac extremity. This was tried and with success. The smallest size was introduced first, then the next size. On the third day the dilatation was continued, and the patient was then enabled to swallow liquids with ease. When alimentation was found completely carried on by the mouth, that is, about one week after the first dilatation, the patient submitted to an operation for closing the gastric fistula. This consisted in carefully denuding the edges and suturing them with silk-worm gut. The patient has to-day gained 25 pounds, and is in comparatively good health.

These two cases illustrate not only the value of gastrostomy as means of supplying nutrition to the body but also of exploring the stomach in its whole dimension. This latter idea, as applied to the pathology of the cardiac extremity, has hitherto not been given sufficient notice, and I will have been amply repaid if others find likewise the solution of some pathological problem of this region by the opportunity of exploration offered by gastrostomy.

SOME POINTS IN THE SURGICAL TREATMENT OF APPENDICITIS.

By AUGUSTUS P. CLARKE, A.M., M.D., of Cambridge, Mass.

Recent experiences of the surgeon, as well as of the general practitioner, have most materially changed the teachings of the earlier writers respecting the treatment of appendicitis. In those cases in which the inflammation of the appendix is of a minor degree it may be overcome by an expectant method. Undoubtedly the larger proportion of the cases involving the additamentum coli is of this lesser grade. Such cases often arise from the presence of bacteria or bacilli which have gained admission into the tissues in immediate connection with the intestinal tract. The symptoms occurring may be characterized by pain or tenderness, by moderate distension, marked constipation, and by disturbances of the constitution generally.

Under favorable circumstances, or by rest and by the application of heat and by the administration of gentle laxatives, the symptoms may subside without exciting any grave apprehensions on the part of the patient, or on the part of those who are in attendance. After intervals more or less remote there is liable to occur, from

various causes, a recrudescence of the inflammation. Not unfrequently, after the lapse of some few days, the disease may take on retrograde processes; in other instance it may become so intensified as to demand prompt surgical interference for the patient's recovery. From a careful study of the histories of cases coming under my observation during a number of years past, and also from learning in many instances the final results, I feel that it is not unsafe to say that in every case in which there is reason to believe that the vermiform appendix is involved, however mild or transient the symptoms may at first appear, the surgeon or medical attendant should be on careful watch for sudden surprises or for untoward results.

There is great probability in almost any event that the appendix during an attack of inflammation will become adherent to other parts in the immediate vicinity. In a case of laparotomy to which I was called for the removal of diseased uterine appendages I found that the vermiform appendix had become adherent to the tube and to the ovary of the right side. The appendix cæci was thickened and also indurated as the result of inflammatory processes of considerable duration. In some instances the first intimation the surgeon may have of the case will be the formation of a localized abscess; this may occur in or near the McBurney point between the umbilicus and the anterior superior spinous process of the ilium or about 5 centimeters from that point on the ilium. The temperature in such a case is not usually very high; it is often not more than 100° to 102½°. The pulse may become soft and compressible, and occasionally much more frequent than the temperature would indicate.

The vomitus is of a dark or grumous substance; at times it is of a light greenish color. When the symptoms become urgent surgical measures should immediately be instituted for relief. In many cases, if not in the most, the incision should be made over the point of greatest tenderness; this point, as before intimated, is midway between the umbilicus and the superior spinous process of the ilium, and is usually in the right linea semilunaris. Such an incision will afford an opportunity for free drainage and for flushing the parts with warm carbolized water or with water of the temperature of 115° to 120° containing boracic acid or other agents that can safely be introduced into the abscess cavity. A liberal incision, when timely made over the tender part, has always yielded in the cases occurring in my practice an immediate and permanent result. In all cases after the incision has been made the parts should be thoroughly explored; if the appendix is within easy reach it should be brought forward and then sewed off by means of sutures of aseptic kangaroo tendon. If, however, the appendix is bound down by firm adhesions, or if it can not be found without much difficulty or without doing excessive violence to the cæcum or to other structures, it is far better to let it remain, for its presence, when left, will not seriously interfere with the patient's recovery.

In a case to which I was called some months since the patient, who was aged 20 years, had been suffering nine days. I made a free incision over the tenderest point; the operation was followed with a profuse discharge of purulent exudation. Careful search at the time was made, but the appendix could not be found. The patient, however, died next day. Extensive dissection at the autopsy revealed the fact that the appendix was drawn upward behind the cæcum and was firmly adherent to the intestine. It required much patience to isolate and to identify it as the part for which we were in search. No portion of the intestine, nor other part, was found gangrenous. It is highly probable that had the patient consented in the early stage of the attack to the operative measures he could have been saved. In another case to which I was called, the patient, a girl aged 14 years, had been ill with local symptoms for four days; there had been much distention of the abdomen. The point of greatest tenderness was lower down than usual, but the symptoms so strongly pointed to the existence of appendicitis that a resort to operative measures was advised.

An incision was made 8 centimeters in length over the point of greatest tenderness; there was considerable discharge of purulent and bloody exudation. The

appendix was unusually long and was bifurcated, and at its junction with the cæcum it was larger than normal. The excision of the appendix was affected without much trouble; it was sewed off, as in the other cases, by means of the cordwainer's stitch, in which kangaroo tendon was employed. The patient made a speedy and an uninterrupted recovery. In another case to which I was called, that of Miss G., aged 13 years, the symptoms had been in progress upward of four weeks. The attending physician had early diagnosticated the case as one of appendicitis and after consultation with another practitioner had advised a resort to surgical measures. The symptoms, however, soon became so much easier that the operation was deferred; after the lapse of some days there was a sudden return of the graver symptoms; at this time I was called to see the case. The parents now declined the proposition for any operative interference unless they could be positively assured of ultimate success. Nothing then remained to be done but the adoption of an expectant method.

For some days the patient was nourished solely by enemas of beef juice, brandy, and beef peptonoids. After that the patient was able to take by the mouth small quantities of malted milk and beef essence. Morphia and other sedatives in small quantities, frequently repeated, were employed. Under this régime the pain was kept under control, the vomiting almost entirely ceased, the abdominal distention markedly lessened, though there was probably suppuration going on at the McBurney point. The father still refused a resort to operative interference. Though the patient was so much relieved the temperature was at times somewhat above the normal. On the thirteenth day from the adoption of the expectant method the patient experienced an unfavorable return of the symptoms. She died from sudden collapse on the following day, which was the forty-second from the apparent onset of the disease. In the treatment of this case the patient had the opportunity to try the benefit of the expectant method, carried out from the first in the most approved manner. Had an operation been undertaken in the early stage of the inflammation the patient would undoubtedly have recovered.

At no time after I was called did it seem that an operation could have afforded much chance for relief, owing to the excessive emaciation and to the other unfavorable phases which the disease had assumed. If consent had been obtained I should nevertheless have given the patient the benefit of an exploratory incision. When an operation in the early stage of the inflammation is undertaken there will be but little difficulty experienced in the removal of the appendix; of course, after adhesions are formed the danger is increased. In all cases the wound should be kept in an aseptic condition; if an abscess has formed the cavity should be irrigated or flushed with a warm medicated solution. When the appendix is not easily reached, or is bound down behind the cæcum, the safer method will be to let it remain and not to make any extended search or dissection, especially after suppuration has taken place. When the mesentery or other structures have been sufficiently detached the appendix should not be tied, but should be clamped, and then should be sewed off by means of carbolized animal sutures; as soon as all bleeding points have been controlled the appendix should be incised about 2 centimeters from the cæcal tissue.

In order to prevent adhesions of the stump or base of the pedicle to other parts, the peritoneal tissue in immediate vicinity of the margin of the incision should be closely approximated by a subperitoneal or by a Lembert suture. The smaller-sized kangaroo tendon, rendered aseptic, should preferably be the material for such use. A thorough closure of the peritoneal surface of the wound thus affected will not only obviate the occurrence of agglutination of the parts, but will also help to prevent the escape into the peritoneum of septic matter that may gravitate toward this point and thus preclude the occurrence of a fistulous tract. The entire wound should as far as possible be kept in an aseptic condition. Aristol and iodoform will be found to be excellent adjuvants in accomplishing this result. The danger of the subsequent occurrence of hernia may be overcome by paying careful attention to

the closure of the several parts that have been divided in the operation; the peritoneum, the muscular tissue, the fascia, and the external integument should each be brought together separately. Carbolized animal sutures should be used for this purpose.

Entire closure of the wound by the first intension can be affected only in those cases in which the operation has been undertaken in the early stage of the attack. After the formation of an abscess complete union at first can not be expected to result, because some method for maintaining drainage for awhile will have to be employed. Some operators recommend that after the appendix has been incised the stump should be disinfected with a small-pointed cautery; in cases in which the appendix has become gangrenous, or in which there has been sloughing or marked septic processes going on, such a method of procedure may do no harm, but in those cases in which it is desirable to achieve immediate union of the tissues cauterization may cause further sloughing, and exudation that will delay cicatrization; in most cases disinfection with 1 to 1,000, or to 2,000 mercuric bichloride solution, and the liberal use of aristol and iodoform will be more conducive to this end, and be a far safer practice to adopt. The different steps of the operation are much complicated when there is present an unusual abdominal distention; so also it will be in cases in which there is excessive or marked obesity.

In one case to which I was called, though the distension was not uncommon, expulsion of the intestine began as soon as a moderate incision was made; the employment of the Trendelenburg posture, however, overcame the complication and enabled me to complete the operation without further inconvenience. The advantage of Trendelenburg's position in all cases of abdominal section for intestinal affections can not be over estimated. In those cases in which some means for drainage become necessary every detail in the treatment should receive the utmost attention, for if there should occur any hindrance to a free discharge of the exudation a risk of a dangerous sepsis to the organism will be incurred. In every such case of abdominal section when a drainage tube has been employed the possibility of the occurrence of hernia should not be overlooked. In all cases, whether the drainage tube has been required or not, a firm binder, or a thorough bandaging should be employed, the patient for some weeks should be kept for the most part in the horizontal position.

As already intimated, an abdominal section with the removal of the appendix, in the early stages of the inflammation, is most likely to be followed with favorable results. In the initial stage of many of the milder cases the medical attendant often hesitates, or shrinks from assuming the responsibility of undertaking operative measures; he rather indulges in the hope that the case will ultimately take on a more favorable aspect. It is true that in some cases there will be for a while considerable improvement which will lead to the thought that the patient may finally recover. In other cases there is an evident fear on the part of the medical attendant that the diagnosis may be incorrect or that the symptoms are dependent on the presence of uncertain factors. Such a conclusion, however, at the present day should not obtain when it is considered that our increasing experience will enable us to decide most accurately, in reference to the elimination of the existence of other possible causes. Assuming that our diagnosis is occasionally incorrect, the dangers of an exploratory incision are infinitely less than would result from allowing the symptoms to progress without availing ourselves of the advantages of an abdominal section, which in most cases is, in any event, when properly carried out, a comparatively harmless procedure.

The question often arises should the surgeon when called upon in the later stages of a case advise operative interference? In answer to this it may be remarked that our experience is favorable to the adoption of an exploratory incision. When an operation is undertaken in the later stages the patient must, of course, assume more risks, for the chances of recovery are much less than when an operation is attempted

much earlier, though surgical measures at such late day may prevent the rupturing of an abscess into the peritoneal cavity. When there has been such a rupture, removal of the pus, and cleansing the parts may afford an opportunity for a retrograde process of the disease to take place. Nothing, therefore, but the occurrence of extreme collapse should weigh against the employment of operative measures. Some surgeons have advised that when the existence of peritonitis has become somewhat diffused it should be regarded as a bar to the adoption of surgical treatment. It should, however, be remembered that the implication of the peritoneum may be dependent in any case on the presence of lesions that may have their origin at a distant point and that the removal of the cause of such morbid processes may effect a speedy subsidence of the peritoneal inflammation; a peritoneal inflammation should always, according to the light afforded by recent pathological investigations, be considered only as a secondary affection to other processes that have had a more or less continuance.

Before closing this paper I deem it important to say that in those cases of appendicitis which have gone on to suppuration before operative measures have been undertaken there may occur secondary abscesses in other parts of the abdominal cavity. An operation to insure relief must, therefore, embrace a course of procedure that will afford a free discharge to all accumulations of purulent exudation; it will sometimes be necessary to make an extensive dissection at different parts and also to overcome adhesions of an unusual extent. Great care will also have to be exercised lest an opening be made into an adherent intestinal mass. In some instances portions of the epiploon may become gangrenous; there may occur in the veins of the abdomen an inflammation that may extend outward to the femoral and to other veins. In carrying out for these complications the necessary surgical treatment much judgment will have to be exercised and much precaution taken that the dissection or search be not prolonged beyond what may afterward prove to be a beneficial or safe proceeding.

APPENDICITIS, WITH ORIGINAL REPORT, HISTORIES, AND ANALYSIS OF ONE HUNDRED AND FORTY-ONE LAPAROTOMIES FOR THAT DISEASE, UNDER PERSONAL OBSERVATION.

By J. B. MURPHY, M. D., Chicago, Ill.,

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Mr. President, Members of the Congress: It might seem necessary to offer an apology for presenting a subject that has been so thoroughly discussed at medical associations and so voluminously considered in medical literature in the past four years. But I will offer none for presenting this subject as many of its important relations to the physician and patient are still mooted questions. There is probably no subject in abdominal surgery on which the profession is so divided and on which such opposite views are entertained. Gynecologists are fairly well agreed on what the procedure should be in cases of pyosalpinx, ovarian cysts, and even now on fibroid tumors, but at every medical meeting in which the subject of appendicitis is discussed we find the physicians almost equally divided for and against operative procedure. The question presents itself, Why are they thus divided? The answer is, They are divided because they have different views, or better, because they are not informed on (1) the pathological conditions that exist; (2) on the probable course or clinical history of the patients suffering from these pathological conditions unaided by the surgeon; (3) on the comparative results to the patient by the aided and unaided methods.

I shall not consider the anatomy of the appendix, nor treat of the various positions in which it may be found. The excellent paper of Dr. Joseph D. Bryant fully elucidates that subject.

Pathological conditions.—Let us first consider the pathological conditions that exist. The inflammatory or infective lesions of the appendix, for a scientific discussion of their relations to the comfort and life of the patient, should be divided into the following classes, because each class has advantages and disadvantages peculiar to itself, and in considering the effects of these lesions upon the patient a fair idea of the percentages can not be obtained unless the classification is carefully carried out, so that the degree of jeopardy may be uniform. The lesions of the appendix and their effect on the surrounding organs and peritoneum should be divided into (1) simple catarrhal appendicitis; (2) ulceration of the mucous membrane without perforation, (*a*) pressure atrophy with infection, (*b*) simple ulceration with purulent accumulation, (*c*) typhoid ulcer, and (*d*) tubercular ulcer; (3) ulceration of the mucous membrane or ulceration of the appendix with perforation; (4) gangrene of mucous membrane of appendix, (*a*) local, (*b*) general; (5) gangrene of appendix complete, (*a*) with perforation, (*b*) without perforation; (6) infection of peritoneal cavity, (*a*) without perforation, local and general, (*b*) with perforation, local and general; (7) peritonitis, (*a*) local peritonitis without limiting adhesions, (*b*) circumscribed abscess, (*c*) diffuse general.

The scope of this paper does not include the neoplasms, traumatisms, nor herniæ of the appendix.

I include in this paper the cases occurring in the practice of my partners, Drs. E. W. Lee, F. S. Hartmann, and H. R. Wittwer, as the cases were all treated on the same basis, and had equal chances of recovery. Though the actual operations were performed by Dr. E. W. Lee, 20 cases with 5 deaths; Dr. F. S. Hartmann, 9 cases with 1 death; H. R. Wittwer, 4 cases with no deaths; Dr. J. B. Murphy, 108 cases with 10 deaths; total, 141 cases with 16 deaths. Mortality with my own cases 9.2 per cent.

Etiology.—The pathological lesions above mentioned are produced by certain causes which we will classify as (1) simple pus-infection, producing the catarrhal variety; (2) extensive infection of wall by the amœba coli, or pyogenic microphytes, producing gangrene of a greater or lesser portion of the appendix; (3) pressure atrophy with infection of appendix, (*a*) fecal concrement, (*b*) foreign body; (4) specific infections, as typhoid, tubercular, etc.; (5) retention accumulations, (*a*) from cicatricial contraction, (*b*) from occlusion with enterolith or foreign body.

Perforations of the appendix from various causes, I have found in the report of 465 autopsies of this disease occurred 324 times; of the appendices removed by us there were perforations 39 times, and 58 removed during attack.

The simple catarrhal variety of appendicitis without retention is seldom brought to the surgeon's attention; more frequently, and still not often, to that of a physician, as it usually accompanies a catarrhal enteritis, and has no symptom peculiar to itself except a slight excessive tenderness in the right iliac region. We have not operated on, nor seen a single case of this class. Catarrhal inflammation with retention is a very different condition; it presents a very serious train of symptoms, producing a pulse as high as 130, temperature of 105°, as can be seen by cases 65 and 118.

This form is frequently brought to the surgeon's attention. It is accompanied by a train of severe symptoms, both local and general, and endangers the life of the patient much more than the preceding one. There were 3 cases of this variety operated on; all recovered. Of the 141 cases operated on the appendix was found completely gangrenous and not perforated in 4 cases, with 4 recoveries. In this form of appendicitis the appendix is usually serrounded by bowel or omentum without a pus infection of the peritoneum.

Pressure atrophy of the appendix with perforation was considered in former times to be due in the majority of cases to foreign bodies that had passed into it from the

alimentary canal. This was erroneous. Later observations show that only a very small percentage is due to foreign bodies, such as seeds, cherry stones, etc., passing into the appendix in that manner, but the great majority of pressure atrophy perforation is produced by fecal concretions (enteroliths). Number of foreign bodies in our cases, 5; 3.5 per cent; number of fecal stones, 43; percentage of fecal stones, about 30 per cent. This does not represent all, as many of the appendices allowed to remain undoubtedly contained them.

The specific infections seldom produce obstruction of the appendix or special symptoms. Of our cases we had one of the typhoid variety. Mrs. B., case 46; operated; recovered. Of the tubercular variety we had one case, and the patient recovered from the immediate effects of the operation and died of a general tuberculosis eighteen months later.

Retention accumulations in the appendix from cicatricial contraction occur where an ulcer has previously existed in the appendix, and the contraction so occludes the caliber of the base of the appendix that the secretions in the cavity of the appendix accumulate, produce distension, bring on attacks of pain, fever, local tenderness, and finally rupture. The only cases of this kind were cases 101 (12 attacks in two and one-half years) and 126 (5 attacks in eight months). The effects of the obstruction of a foreign body or concrement at the base of the appendix is the production of a gangrene of the appendix: (1) By infection and gangrene (not by restriction of circulation, as the appendix receives its blood supply from the side, not from the end); (2) by retention of contents; (3) by strangulation from swelling of mucosa. The cases of this kind will be considered under the head of gangrene of the appendix.

Pathological lesions.—Simple recurrent catarrhal appendicitis is considered by some physicians to be a frequent disease. The course of this disease is supposed to be an inflammation of the appendix and an accumulation within the appendix of the products of inflammation with the subsequent escape through the opening of the appendix into the cæcum. That recurrent appendicitis is not of this variety I am convinced. Recurrent appendicitis in the cases that we have operated upon is due most frequently to a foreign body in the appendix, and next in frequency is due to the cicatricial contraction, *and these recover not by the passage of the products of inflammation through the neck of the appendix into the cæcum, but by an ulceration from without inwards in wall of cæcum,* from a circumscribed suppuration about the appendix at the seat of the foreign body. These cases are misnamed by some authors cecitis or pericecitis. Matterstock, in 146 autopsies for perityphlitic abscess, found the cæcum perforated from within outwards twice. Number of cases of this class diagnosticated recurrent catarrhal appendicitis, and operated on by us, 3; of these all showed rupture of wall and opening into cæcum, and all recovered.

A simple ulcer of the appendix produces symptoms in two ways: (1) By occlusion of the appendix from a swelling of the mucous membrane and the tension produced on the serous coat; (2) by an infection of the peritoneum through the wall of the appendix or along its mesentry. In the literature on this subject we are led to believe that a pus infection of the peritoneum only occurs with perforation. This is erroneous, as in a number of our cases with simple ulcers of the appendix we had (*a*) an infection of the mesentery and peritoneum, and yellow flakes of purulent material (*see* case 67); (*b*) accumulations of a quantity of pus in the peritoneal cavity without perforation (*see* case 143). This is very important, for in ulcerations of other portions of the alimentary canal such pathological conditions are reported as occurring; and why should the mesentry of the appendix not be injected, or why should the peritoneum not be infected without perforation of the appendix, that is, by simple ulceration, as in other portions of the alimentary canal? There is no reason; and while it has not been previously noted I have found it, nevertheless, a common pathological condition.

That simple ulceration of the appendix with perforation should produce a serious, if not fatal, peritonitis is to be expected the same as perforating ulcers of other

portions of the alimentary canal. When a perforation first takes place, to which there are many exceptions, the rule is that adhesions are formed about the appendix, but as the accumulation outside of the appendix increases these adhesions are ruptured and the contents of the abscess cavity escapes into the peritoneum with the results to be considered under general septic peritonitis.

Partial gangrene of the appendix is produced in three ways: (1) Mechanical compression by foreign bodies; (2) by accumulated fluid; (3) and most frequently by infection of wall—*a*, biotic; *b*, toxic. The latter was the most frequent condition.

Complete gangrene of the appendix, (*a*) with perforation; (*b*) without perforation. In complete gangrene of the appendix, either from compression at its base by a foreign body or by infection of its wall, destroying the vitality of the tissue, or by contortion, shutting off its circulation, if an early operation is performed the appendix will be found black, nonadherent, surrounded by omentum which is adherent to the wall of the bowel, and with pus infection of the peritoneum. It looks as though it were a miniature gall bladder with extremely thin walls. The dangers of this variety with early operation, before it has perforated, one can readily see, would be small, as the cæcum can be lifted into the wound, the appendix ligated, excised in the absence of pus in the peritoneal cavity, and with very little danger of subsequent infection.

When the appendix has perforated, as in subdivision *a*, the contrary is the case. We have a greater or lesser accummulation of the products of infection, gangrene of the appendix, and the microphytes in the peritoneum, with or without adhesions. In this variety perforation can take place directly into the peritoneal cavity and a general peritonitis be produced, in which there is no effort at limiting adhesions, the same as you find following gangrenous destruction of other portions of the body from infection in which there is an absence of the effort of limitation and a nonrestricted advancement of infection.

Peritoneal infections.—The first variety of infections without perforation I have mentioned under the head of ulceration of the mucous membrane. The second variety is of the most common occurrence in disease of the appendix, a small circumscribed abscess as a result of perforation. The effect of this abscess in its subsequent course depends (1) on whether there follows necrosis of the wall of the adherent intestine which protects the peritoneal cavity, allowing the entrance of the contents of the abscess into the intestine; (2) whether the abscess is retained within the constantly dilating sac, producing a large accummulation always separated from the general peritoneum, and which can be treated surgically by a lateral incision without opening the unaffected portion of the peritoneal cavity; (3) whether the abscess suddenly ruptures into the peritoneal cavity, or (4) whether the abscess opens into other of the neighboring viscera or cavities, as kidney, bladder (case 82), pleura.

The local, circumscribed peritoneal abscess is a source of danger (1) from absorption; (2) from necrosis of the tissues forming its walls, that is, wall of the bowel, followed by hemorrhage and death (case 54); (3) danger of rupture into the general peritoneal cavity; (4) thrombo-phlebitis, secondary abcess. (Cases 10 and 26.)

General suppurative peritonitis, as a result of diseases of the appendix, is produced (*a*) by a direct perforation and emptying of the contents of the appendix into the peritoneal cavity (many cases); (*b*) by a rupture of a small circumscribed abscess that had previously formed around the appendix (case 108); (*c*) by infection through wall of appendix (many cases), and also abscess (case 86); (*d*) by rupture of gangrenous appendix into peritoneal cavity (numerous).

The result of the infections of the peritoneum, or general suppurative peritonitis, depends upon the pathological changes produced by the infection on the surface of the peritoneum.

(1) We have a dry septic variety of peritonitis, more or less, with complete exfoliation of the endothelium of the peritoneum, which terminates fatally in a very short period of time, as in cases 25 and 43.

(2) We have, where the quantity of pus is considerable, a ptomaine poisoning from the immediate absorption of the quantity of pus poured into the peritoneal cavity, where the patient at the end of four to twelve hours after the rupture will die with the most profound symptoms of collapse from toxæmia. (*See* cases 102 and 104.)

(3) We have an escape of a quantity of pus into the peritoneal cavity, generating a general suppurative peritonitis. Of this variety there were 36 cases, with 12 deaths. In all of these the patient had no immediate manifestations of collapse. In many the pulse was not above 90, temperature not above 100°, even in cases at the time of operation in which the surface of the bowel in one-half or three-quarters of the entire abdomen was covered with pus. This condition can exist four, five, six, or even seven days without producing the symptoms of collapse, which are recorded in our text-books as occuring *immediately* from *infections* or *ruptures* into the peritoneal cavity. The symptoms of collapse come on in these cases *only after an absorption of the products of inflammation*, never primarily, and when they do come on the patients die within a very few hours after their onset. The symptoms of collapse in these cases always surprise the attending physician, as his patient before their onset is considered to be very far advanced in convalescence—indeed, if not cured, and this explosion surprises him like a thunderclap from a clear sky.

I will not go into the details of the clinical history of the many varieties of lesions and their sequences which I have now related, as you can readily understand how the course in the various pathological conditions would differ. There is probably no disease in the abdominal cavity that produces such a multiplicity of manifestations, pathological conditions, and variety of dangers as that of lesions of the appendix. In comparing the operative with the nonoperative treatment all these pathological conditions must be considered separately, otherwise we can draw no reliable conclusions as to the merits of various procedures. In order to do this the symptoms of each lesion must be so distinctly and separately outlined that the lesion can be recognized by the medical man without operating as well as by the surgeon with operating. We will, therefore, now consider the symptomatology of appendicitis.

SYMPTOMATOLOGY.

Can we recognize the various pathological conditions by the symptoms? Can we say from the symptoms, this is catarrhal appendicitis; this is peritonitis? Emphatically, no. What are the symptoms of acute catarrhal nonobstructive appendicitis? They are the symptoms of enteritis, with a slight increase in the local tenderness over the appendix. What are the symptoms of suppurative appendicitis with obstruction, that is, with retention of products of infection within the appendix? Sudden attacks of pain in the abdomen, either localized to the right iliac region, or general, shortly followed by nausea and very frequent vomiting. Tenderness, most frequently local, occasionally general; extreme tympanites; a pulse of from 120 to 130; temperature of from 104° to 105½°; in fact, the classical symptoms of peritonitis, and still no peritonitis present. (*See* cases 83 and 116.) The symptoms of ulceration of the mucous membrane without perforation are just the opposite to the preceding ones in intensity, being, as a rule, the same symptoms, but very mild; and with specific ulceration, as typhoid and tubercular, they are also practically the same as the latter. (*See* cases 46 and 30.)

In ulceration with perforation we have (1) a sudden attack of pain, (2) followed always by nausea and frequently vomiting, (3) increased local tenderness in right iliac region, (4) a temperature of 102–3°. These symptoms continue for three days. They may be accompanied by extensive tympanites and general tenderness. If the abscess remains circumscribed, they will gradually subside, and at the end of a week the temperature will be 99½° to 100°, pulse 90°, absence of general tenderness, absence of tympanites, and only local tenderness present. But still there may be an abscess in the peritoneal cavity.

Gangrene of the mucous membrane has no special symptoms different from those just mentioned with ulcerative perforation, and can not be determined until the abdomen is opened and the appendix examined. There are following a perforation of the appendix, no special symptoms except a possible exacerbation of pain and an increased area of tenderness.

We have now considered the leading symptoms of the varieties of appendicitis *per se*, without its complications, and we recognize four cardinal symptoms within the first forty-eight hours in every case: (1) Sudden pain; (2) nausea and vomiting; (3) increased local tenderness over the appendix; (4) elevation of temperature.

These symptoms occurring in a healthy individual are pathognomonic of this disease, and all that is necessary for its recognition. They are most marked and characteristic within the first forty-eight hours; therefore the diagnosis is most readily and positively made at that time.

Special care should be exercised in excluding females with a history of genito-urinary infections.

The infections of the peritoneal cavity without perforation have no immediate symptoms to those of appendicitis without infection of peritoneum. *Infection of the peritoneum with perforation has, immediately following the perforation, no special symptoms above a circumscribed peritonitis or a simple lesion of the appendix without perforation.*

The constitutional symptoms of a circumscribed abscess in the neighborhood of the appendix, immediately on its formation, are usually pain and vomiting, an elevation of temperature approximating 103°. This continues for four or five days; subsides to 99½°, or even 99°, as long as the abscess remains circumscribed and does not open into the peritoneal cavity or into the retroperitoneal cellular tissue. Induration; increased local tenderness.

Diffuse general peritonitis.—What are the symptoms of diffuse general peritonitis? If the members of this congress were to answer that question from our text-books or cases reported in our journals, they would say immediately—that is, within a few hours after the infection—symptoms of tympanites, intense pain, collapse, particularly the latter, would be present. I desire to call your attention to the symptom of collapse as a manifestation of peritonitis, because it is misleading. We are taught in our text-books that the patient has, immediately following a rupture into the peritoneal cavity of one of the viscera, or an abscess, particularly the latter, the manifestation of collapse. I will state now that that symptom does not occur, except under special conditions, and I would warn the doctor who relies on the symptom of collapse as an immediate manifestation of perforation that he is in error, except in cases of sapræmia, as before mentioned, and that his erroneous idea on this subject will cost him the lives of many of his patients. The manifestations of ruptures into the peritoneal cavity depend upon: (1) The character of the material entering the peritoneal cavity; (2) the quantity of material; (3) the pathological changes produced within the peritoneum by various substances, and (4) resistance offered by peritoneum.

Examples of the first, where the substance admitted into the peritoneum is chemically irritating or poisonous, as gastric juice, fluid from hydatid cysts, cysts of the kidney, etc. As a result of these admissions into the peritoneal cavity we have immediate manifestations, such as pain, tenderness, and collapse.

Examples of the second, where the quantity of material cuts an important figure. If the quantity of material be small, as of the substances mentioned in No. 1, as well as the admission of pus or the rupture of small abscesses into the peritoneal cavity, which we see in every day practice, the immediate manifestations of their presence may be very limited and transitory. While if a large quantity be admitted, the rapid absorption by the peritoneum of their toxines, or ptomaines, produces rapid collapse and death without waiting for inflammatory reaction, the same as if a poisonous alkaloid were injected into the peritoneal cavity, as in case 102.

Examples of the third, where substances small in quantity but particularly sep-

tic in their nature cause a peritonitis of greater or less severity, of which peritonitis may assume the fulminating, dry form so dreaded by all laparotomists, fortunately a form of rare occurrence and not amenable to treatment. Or the slow variety in which there is an accumulation of sero-purulent material which gradually increases in quantity and spreads over the surface of the bowel, producing but slight disturbance for a number of days until such time as the rapid absorption of the products of inflammation takes place and the patient suddenly collapses and dies. The pus is guided in its advancement on the surface of the intestine by the positions of the coil as shown by the formation of secondary abscesses on the opposite side.

Errors in diagnosis occurred three times: (1) A perforating round ulcer of the stomach caused the peritonitis; (2) an extra nephritic renal calculus on right side; (3) rupture of a psoas abscess; (4) gangrene of entire mucous membrane of colon (diphtheritic colitis). All cases except the last demanded immediate operation. It will be further noted that in every one of these four cases there was an absence of some of the cardinal symptoms.

In order to determine the advisability of operative interference, we must ascertain as near as possible: (1) What percentage of the cases terminate fatally that are not interfered with surgically? (2) What percentage of the same class of cases terminate fatally that are operated upon? (3) What are the additional dangers of the operation *per se?* It is estimated on good authority (Crafts) that from 27 per cent to 30 per cent of all cases treated medicinally terminate fatally sooner or later if not operated. On that point I can not furnish statistics of my own, as I operate on all cases. The percentage of deaths in our cases was 11 per cent, or 16 deaths in 141 cases. In the first 100 cases we had a mortality of only 7 per cent. Since that I lost three consecutive cases in as many days. The causes of death in our cases were: (1) Pyæmia: 1, septic pneumonia; 2, septic phlebitis, multiple infarcts. (2) Ptomaine poisoning. Rupture of large abscess into peritoneal cavity at time of operation. (3) Septic peritonitis. In thirteen the peritonitis existed before operation out of 36 cases of general septic peritonitis operated.

I consider the dangers of the operation comparatively *nil* in competent hands.

What operation should be performed? In early cases the lateral incision over the most common seat of the appendix in the right iliac fossa should be given the preference. In late cases the incision should always be over the most prominent portion of the induration. In this class of cases the appendix is removed only when it presents itself palpably in the wall of the abscess and can be removed without rupturing the adhesions which separate the abscess from the uninfected portion of the abdomen. In early cases always remove the appendix, as it is the only certain means of preventing recurrence. I had 11 cases of recurrence in which the appendix was not removed at the primary operation; 6 of these were reoperated upon early in their first recurrence; appendices removed; all recovered.

We never use fluid of any kind in the peritoneal cavity, pus or no pus.

When should we operate? On every case of appendicitis, or better on every case where we have present the four cardinal symptoms: (1) Sudden attack of pain over appendix; (2) always nausea, frequently vomiting; (3) elevation of temperature; (4) exaggerated local tenderness in various positions occupied by the appendix.

In every case in which the above symptoms were present, including every case on which we operated, except those mentioned as errors, I found pus, gangrene, or proof that it had previously existed within or about the appendix. In one case, in which elevation of temperature was absent, the mucous membrane of the appendix was ecchymotic. The operation should be performed at the earliest possible moment after the onset of the symptoms. (1) Because at that time the inflammation is limited; (2) the appendix is easily located and removed; (3) the time for rupture into the general peritoneal cavity has not occurred; (4) the gangrene of the bowel in the neighborhood has not taken place; (5) Matterstock states that upwards of 50 per cent of the mortality from disease of the appendix occurs before the sixth day.

It is therefore evident that the operator who waits to operate as late as the sixth day will lose 50 per cent of all the cases that would terminate fatally without operation.

I desire to urge upon you that you operate on all cases; (*a*) because pus or gangrene is present in 99 per cent of the cases; (*b*) that you operate early so as to prevent the disastrous effects of a rapidly spreading disease in the peritoneal cavity and save yourself the humiliation of an ante-mortem operation.

Case 1.—Date of operation, November 9, 1885. Operator, Dr. Murphy. L. E. age, 24; male. Cook County Hospital.

History: Two weeks before operation patient began to feel pain in right iliac region and in lower part of abdomen; nausea; vomiting and elevation of temperature. He noticed a swelling in right iliac region which gradually increased in size up to the time of operation.

Operation: Incision over highest point of induration, drainage of abscess cavity; general peritoneal cavity not opened. Appendix was not removed. About 12 ounces of pus escaped. Patient made a rapid recovery.

Case 2.—Date of operation, March 2, 1889. Operator, Dr. J. B. Murphy. L. Z. age, 19; male. Cook County Hospital.

History: Patient had been sick for three weeks with the usual symptoms of appendicitis at the time of entrance into hospital. Some induration present. Temperature 99°.

Diagnosis: Appendicitis with perityphlitic abscess.

Operation: Lateral incision directly into the abscess. General peritoneal cavity not opened. A fecal stone the size of a bean escaped in the pus. The appendix firmly imbedded in a mass of induration was not removed. Recovery.

Case 3.—Date of operation, March 22, 1889. Operator, Dr. Murphy. Mrs. O'D., age 35.

History: Typical attack began March 1. Severe symptoms of peritonitis were manifested on the 7th. Patient had fever, sweats, and evening elevation of temperature until time of operation. Abdomen greatly distended; induration extended from right side beyond the median line to the left. Abdomen tympanitic over induration, which was explained by presence of gas in the abscess cavity.

Operation: March 22, three weeks after onset of attack. Lateral incision; about 2 quarts of very offensive pus escaped. The bowels were covered with a thick layer of fibrin. Drainage (rubber tube). Recovery.

Case 4.—Date of operation, March 25, 1889. Operator, Dr. Murphy. L. G., age 14, female.

History: On the 18th patient complained of pain in right iliac region, followed by vomiting. Temperature, 102°. March 19th, temperature, 99½°; pulse, 90. Tenderness increased in right iliac region vesical tenesmus. These symptoms continued without an elevation of temperature, about 99½°, until time of operation. The induration was about the size of a hen's egg.

Operation: Lateral incision into abscess. General peritoneal cavity not opened. Appendix not removed. Drainage. Recovery.

Case 5.—Date of operation April 10, 1889. Operator, Dr. Murphy. Mr. X., age 55.

Case occurred in practice of Dr. Hicks, of Burlington, Wis. Patient had a typical attack of appendicitis six weeks ago. Since then has been confined to bed with fever, sweats, pain, and tenderness in right iliac region. Dr. Hicks pronounced the case one of perityphlitic abscess, and, on the following day, Dr. Murphy, assisted by Dr. Hicks, performed the operation.

Operation: Lateral incision; general peritoneal cavity not opened; large quantity of very offensive pus escaped. The abscess extended down into the pelvis. No foreign body, no fecal stone. Drainage. Recovery.

Case 6.—Date of operation May 3, 1889. Operator, Dr. Murphy. T. B., age 13, male.

History: April 25, 1889, patient came to my office complaining of pain in right iliac region.

Examination: On examination no swelling could be detected, no elevation of temperature. He presented himself again May 3, with pinched, anxious expression of countenance; pain, swelling, and tenderness in right iliac region. No fluctuation, no symptoms of phlegmon in the abdominal wall. Temperature, 102⅘°; pulse, 128. Diagnosis: Perforated perityphlitic abscess.

Operation: Lateral incision; the induration has lost its resistance under the anæsthetic; peritoneal cavity opened; an abscess found in the retro-cæcal region. Fecal stone size of a lima bean. The appendix had been amputated at its base by an ulcer; the body of the appendix retained its vitality by adhesions to the cæcum; removed; drained. May 4, temperature, 99°; pulse, 120. Vomiting constantly. May

5, temperature, 101.4°; pulse, 136. Still vomiting, countenance pinched and anxious; delirious; very tympanitic over entire abdomen. Died same day. General septic peritonitis.

Case 7.—Date of operation, May 16, 1889. Operator Dr. Lee. D. L., aged 19, male. Patient's attack began May 10, with severe pain in right iliac region accompanied by nausea and vomiting; these symptoms continued and constantly increased until May 13, when the pain extented all over the abdomen, but the greatest sensitiveness was in the right iliac fossa. Induration could be felt there without the signs of fluctuation or phlegmon. May 16, General amelioration of symptoms; pulse 84, temperature 99°.

Operation: Lateral incision, no infiltration of subperitoneal tissue. Intra-peritoneal abscess opened, drained; appendix adherent its entire length along the wall of cæcum. Drainage. Recovery.

Case 8.—Date of operation June 23, 1889. Operator, Dr. Murphy. H. R., age 26, male.

On June 18 patient was seized with pain in right iliac region, nausea, vomiting, and constipation. At the end of twenty-four hours the symptoms became those of general peritonitis.

Examination: On the third day distinct induration could be felt in right iliac region extending half way to umbilicus. No induration from rectum. Operation consented to on fifth day.

Operation: Lateral incision. When the peritoneal cavity was opened to my great suprise it appeared perfectly healthy. No adhesions to anterior abdominal wall. The large induration which before operation seemed to extend to umbilicus had disappeared. A careful examination revealed an indurated mass close to the spinal column to the left just below the level of the umbilicus. The adhesions were gently separated, and an abscess opened; inserted drainage tube, packed about with iodoform gauze. Recovery. This case illustrates how deceptive the sign of induration may be in the acute stage. It appeared to be in the case close to the abdominal wall in front, and when the peritoneal cavity was opened it was found located at the posterior wall. The induration always appears larger than it actually is. This difference being most marked in the first few days of the attack.

Case 9.—Date of operation August 9, 1889. Operator Dr. Murphy. Mrs. N., age 56, female.

History: Patient had complained of pain and discomfort in right iliac region two weeks previous to August 4, 1889. At this time the pain became very intense, and a doctor was called at midnight to relieve her. Nausea, vomiting, great abdominal pain and tenderness, and depression. These symptoms continued for four days. A consultation was called and an operation decided upon. The patient was extremely obese, no induration could be detected either from without or from the rectum.

Operation: Laterial incision, directly into abscess; about an ounce of pus (very offensive) escaped and with it a small fragment of bone. General peritoneal cavity not opened. Rapid recovery.

Case 10.—Date of operation August 16, 1889. Operator, Dr. Murphy, F. F., age 56, male.

History: On August 16 patient was seen in consultation with Dr. Volini who had made a diagnosis of perityphlitis and gave the following history. Three weeks ago patient was attacked with severe pain in abdomen followed by nausea, vomiting, and high fever. Pain rapidly extended over the entire abdomen and the patient became very tympanitic. The tympanites and general abdominal pain subsided in four or five days, but the sensitiveness and induration remained in the right iliac region up to time of operation. The patient was very much emaciated and presented all the appearances of a typhoid in the the third week. Diagnosis: Peri-appendicitis (circumscribed abscess).

Operation: Lateral incision; general peritoneal cavity opened; circumscribed abscess evacuated. Drainage. August 17, temperature 99½°; August 20, temperature 100½°; August 20, temperature 102°; August 21, temperature 100½°; August 22, 99½°; August 26, temperature 100½°; August 27, temperature 101°; August 28, temperature 102°; August 29, temperature 100,⅘°, evening; August 30, temperature 99,⅘°, morning; August 30, temperature 101,⅘°, evening; August 31, temperature 102°, morning; August 31, temperature 103½°, abscess burst through; September 1, temperature normal a. m.; September 1, temperature 103½°, p.m.; September 1, midnight chill; September 2, temperature 102½°; September 2, temperature 102°; September 3, temperature 102½, a. m.; September 3, 3 p. m., died.

A second abscess was opened posteriorly on the 29th of August. Patient had a chill September 1, with pulmonary symptoms, from that time he continued to sink, and died September 3. Autopsy revealed embolic pneumonia of lower lobe of right lung. Sero-purulent fluid in right pleura cavity. Lungs otherwise normal, heart and liver normal. Remains of primary abscess in neighborhood of vermiform appendix which was opened in the first operation. Down in the retro-peritoneal cellular

tissue a second abscess cavity was found which had been opened in the second operation; from this abscess he received his fatal pyæmia. No peritonitis, no infarcts in any of the other organs. Head not examined.

Case 11.—Date of operation October 1, 1889. Operator, Dr. Hartman. S. W., age 10 years, male.

History: Patient was taken sick with a typical attack many months before; the abscess was aspirated and finally an external fistula formed. The patient improved, was up and about, but a mucous discharge continued from the sinus.

Operation: A laparotomy was performed; peritoneal cavity opened; fecal stone at the base of the sinus was removed from the appendix, which was adherent to the abdominal wall and cæcum. The appendix was not removed, but its mucous membrane was curetted. Uneventful recovery.

Case 12.—Date of operation December 17, 1889. Operator, Dr. Lee. I. D., age 22, male.

History: About December 3, 1889, patient was taken suddenly ill with pain in right iliac region, accompanied by faintness and vomiting. These symptoms continued for two weeks together with fever and sweats.

Examination: On examination was found a large circumscribed induration in right iliac region. Temperature 102°, pulse 120.

Operation: December 17, fourteen days after onset. Lateral incision; peritoneal cavity opened; contained a serous fluid and was very much congested. Large mass of adherent intestines could be seen; on separating these a pus cavity was opened and drained. Pulse and temperature rapidly fell to normal and patient made a speedy recovery.

Case 13.—Date of operation January 16, 1890. Operator, Dr. Murphy. D. L., age 20, male.

History: Had an operation in May, 1889, for drainage of a perityphlitis abscess. Present attack typical; local pain, vomiting, fever, tenderness, and induration.

Operation: Fourth day after onset. Drainage of a circumscribed abscess. Appendicisectomy. Recovery. (*See* history of Case No. 7, May 16, 1889.)

Case 14.—Date of operation, January 26, 1890. Operator, Dr. Murphy. R. W., male, age 26. Occurred in practice of Dr. Devlin.

History: Patient's sickness commenced with a typical attack January 19. January 20, temperature 101°, symptoms continued; January 21, temperature 102°, induration detected in right iliac region. Operation advised. From January 22 to 24 temperature ranged from 101° to 102½°; pain and tenderness increased, and induration extended to above the crest of the ilium; January 25, temperature 103½°; January 26, operation.

Operation: Lateral incision into pus cavity; general peritoneal cavity not opened. Appendix not removed. Half a pint of pus evacuated. Drained. January 27, temperature normal and remained there. Recovery.

Case 15.—Date of operation, February 28, 1890. Operator, Dr. Murphy. T. McC., aged 29, male. Patient had had 20 attacks previous to this one.

History: One week prior to operation patient had a typical attack of appendicitis. Symptoms continued, accompanied by a temperature of 103° up to the time of operation. Pulse, 120°.

Operation: Lateral incision; a large pus cavity opened without opening the general peritoneal cavity. About 20 ounces of pus escaped. Appendix not removed. Second day after operation fever had permanently disappeared. This case recurred, but was not operated.

Case 16.—Date of operation, March 27, 1890. Operator, Dr. Murphy. N. Le B., male, age 26. Cook County hospital.

When patient was admitted to hospital a slight induration could be felt in right inguinal region. There was great tenderness in the region of the induration. Patient says he had a similiar attack about three years ago. Temperature at time of operation 100°.

Operation five days after beginning of attack; usual incision; appendix found encircled and adherent to omentum; appendix loosened from adhesions and amputated; it was large and swollen, the size of a man's little finger; the stump was cauterized and top-sewed; no pus in peritoneum; iodoform gauze packing; pus was found in appendix. Recovery.

Case 17.—Date of operation June 11, 1890. Operator Dr. Murphy. Wm. H., age 20 years, male. Cook County hospital. Patient was transferred from medical side of Cook County hospital to surgical side for operation.

Operation: Typical incision; the appendix was located, ligated and amputated; the stump top-sewed with silk; the abdominal cavity was closed without drainage; the appendix contained enterolith and pus. Patient made a rapid recovery.

Case 18.—Date of operation, June 25, 1890. Operator, Dr. Murphy. Miss W. Richmond; age, 27 years. Presbyterian Hospital.

History: For the past four years patient has had recurrent attacks of severe pain in abdomen, which came on suddenly, continued for several days, and was followed by a soreness of some days' duration. Present illness. Patient was taken sick on May 12, 1890, with an attack far more persistent.

Case 19.—Date of operation, June 26, 1890. Operator, Dr. J. B. Murphy. Rev. G.; age 40; male. One June 23; patient was seized with griping pains in right iliac region which gradually increased, accompanied by vomiting. Pulse that evening 120; temperature, 102°. Localized tenderness; induration; general tympanites.

Operation: Appendicisectomy: Appendix nonadherent, gangrenous, not perforated. The serous coat of the appendix was stretched over the gangrenous *debris* of mucous membrane and pus; it was not protected at base and rupture was imminent. There was no infection of peritoneum. How different the condition would have been twenty-four hours later. The appendix would have ruptured, a septic peritonitis developed as there were no protecting adhesions, and the patient's life would have been greatly jeopardized, if not sacrificed. Rapid recovery.

Case 20.—Date of operation, July 15, 1890. Operator, Dr. F. S. Hartman. Mrs. B. Typical attack; pain, vomiting, temperature and slight induration over crest of ileum, posteriorly.

Operation: Two weeks after onset of attack. Incision over crest of ileum, posteriorly, drainage of a circumscribed abscess. Appendix not removed. General peritoneal cavity not opened. Recovery rapid.

Case 21.—Date of operation July 24, 1890. Operator, Dr. Lee. N. C.; age, 34 years; female.

Present sickness commenced July 16, complained of chills, fever, vomiting, and abdominal pain, latter more pronounced in ileo-cæcal region. July 18, pulse 120, temperature 103°. Slight tenderness in ileo-cæcal region. July 21, pulse 124; temperature 102.5°. Great pain over whole abdomen. Tenderness over ileo-cæcal region marked and induration present.

Operation: Appendicisectomy. Appendix large, swollen, and tortuous; no perforation. Appendix contained enterolith in which was imbedded a small spicula of bone. There were no adhesions around the appendix. Peritoneal cavity opened. No abscess. Pus in appendix around enterolith. Gauze drainage. Temperature fell to normal immediately after operation. Recovery.

Case 22.—Date of operation, August 2, 1890. Operator, Dr. Lee. H. McQ.; age, 10 years; female.

Present illness of patient began July 27, with pain in ileo cæcal region and diarrhea. August 1, pulse 130; temperature 103°. Tenderness in right iliac region. Induration.

Operation: Drainage of circumscribed abscess; general peritoneal cavity not opened. Appendix not removed. No foreign body found. Temperature fell to normal within twenty-four hours after operation. Recovery.

Case 23.—Date of operation, August 22, 1890. Operator, Dr. Lee. Present, Dr. Bridge, Cook County Hospital. C. P. A.; age, 21; male.

Patient had a similar attack five years ago. Three days previous to operation patient was seized with sudden pain in right iliac region. Temperature 102.2°; temperature August 20, 103.3°; temperature August 21, 100.8°.

Examination: Abdomen moderately distended, tympanitic. Dullness in right iliac region and marked tenderness over appendix. Tongue slightly coated.

Operation: Incision over induration, escape of pus and two enteroliths. Drainage. Recovery.

Case 24.—Date of operation September 6, 1890. Operator, Dr. Lee. J. R.; age, 16; male. Case occurred in the practice of Dr. McCarthy. Patient's present sickness began August 29, with acute pain in lower part of abdomen; diarrhea. Temperature 101.8°, pulse 112; on August 30, temperature 101.3°, pulse 106; on September 1, temperature 101., pulse 100; on September 2, temperature 101°, pulse 98. Tenderness on pressure over lower portion of abdomen, which gradually became localized in right iliac region and induration developed.

Operation: Incision and drainage of intra-peritoneal abscess. General peritoneal cavity opened. Appendix not removed. Temperature fell to normal inside of forty-eight hours. Recovery.

Case 25.—Date of operation September 18, 1890. Operator Dr. Lee. F. W. H.; age 25; male. Case occurred in the practice of Dr. McCarthy. Present illness commenced suddenly September 14, with intense pain in right iliac region, persistent vomiting and diarrhea. General abdominal tenderness more marked over the right iliac region. Tympanites. Patient lies with knees drawn up and bears a distressed look. Temperature 102.2°, pulse 116. September 15, temperature 102.6°, pulse 122; nausea; singultus. Tenderness and tympanites general. Slight induration in right iliac region. September 16, temperature 102.2°, pulse 126; induration more marked and extensive; tenderness increased. Dr. Lee called in consultation. Diagnosis, rupture of appendix with intra-peritoneal abscess.

Operation: Typical incision. No induration to be felt after incision; dry septic peritonitis; appendix perforated; small abscess around base; drainage. *Exitus letalis* on third day.

Post-mortem: General dry septic peritonitis; perfect adhesions around gauze packing.

Case 26.—Date of operation, November 9, 1890. Operator, Dr. Lee, Cook County Hospital. Mrs. M. P.; age, 32.

Patient has had several attacks of same nature as present one in last three years. One week before admission to hospital present attack began with fever, chills, sweats, and pain in right iliac region. Patient presents appearance of a grave typhoid; tongue and teeth heavily coated, lips covered with a herpetic eruption. At time of admission patient had a temperature of 104.6°, and had severe septic symptoms. In right inguinal region, 3½ inches from anterior superior spine of ileum, is an induration.

Operation: Incision over tumor into abscess; pus and feces escaped; packed with iodoform gauze.

Death from pyæmia, which was present at time of operation, in three days. Temperature reached 106° several times. Frequent chills. No septic peritonitis.

Case 27.—Date of operation, November 15, 1890. Operator, Dr. Lee. O. P. P.; age, 31 years; male. Patient had sudden attack; severe pain in right iliac region; chills, fever (temperature 103°), vomiting, general abdominal tenderness. More marked in right iliac region, where induration could be felt, which was dull on percussion.

Operation: Incision, drainage of an abscess without opening intra-peritoneal cavity. Appendix not removed. Fecal fistula. Recovery. Patient subsequently had recurrent attacks and was again operated. (*See* history No. 30.)

Case 28.—Date of operation February 14, 1891. Operator, Dr. Lee. R. S.; male; age, 28.

History: For the past two years patient has been subject to frequent attacks, beginning with pain in right iliac region, generally accompanied with nausea and vomiting. Attacks usually lasted from a week to ten days. During past six months patient had an attack about every three weeks.

Examination: Induration in right iliac region.

Operation: Appendicisectomy. General peritoneal cavity opened. The vermiform appendix was found perforated near the base, which communicated with an abscess cavity that had opened into the cæcum. A probe could be passed through the opening into the cæcum. Drainage. Recovery.

Case 29.—Date of operation, March 9, 1891. Operator, Dr. Murphy. Miss McC.; age, 23.

History: First attack of pain, 1889. Sudden pain in right loin, followed by fever, tenderness, vomiting. The swelling gradually increased in loin, and case was seen by several physicians in the next year, all agreeing that it was a sarcoma of the kidney. It finally was opened in the back and a small quantity of pus escaped. Two fecal stones escaped from the opening after some months' time; this was followed by the discharge of berry seeds for several months, no other material escaping. At the end of about a month I operated to close the fistula in the cæcum. This was by suture and was successful. The history of this case extended over a period of about three years. Recovery.

Case 30.—Date of operation, May 19, 1891. Operator, Dr. Lee. O. P. P.; age, 31; male. Cook County Hospital.

Patient had a primary operation for appendicitis in November, 1890. An intra-peritoneal abscess was drained, but the appendix was not removed. An April, 1891, a laparotomy was performed for removal of the appendix, but on account of the extensive adhesions it was impossible. Patient was seen three days after onset of present attack, and by an operation the appendix was amputated; two enteroliths were found in it; a rubber drain was inserted and the abdominal incision partially closed. Patient made rapid recovery. There remained a small sinus leading down to the iliac fossa for several weeks.

Case 31.—Date of operation, June 4, 1891. Operator, Dr. Murphy, Cook County Hospital. J. C.; age, 27; male.

Patient was seen five weeks after onset of attack. His illness commenced with pain in the right iliac region.

Examination: Hard tumor in right iliac region, not movable, seemingly attached to ileum. Percussion dull over tumor; other side percussion normal. Temperature, 101.2°.

Operation: Incision into pus cavity. The appendix, which was difficult to locate, was drawn into abdominal incision, ligated near its base, and amputated. Drainage. Recovery in three weeks. The appendix was perforated near its base.

Case 32.—Date of operation, June 6, 1891. Operator, Dr. Murphy, Alexian Brothers' Hospital. F. F.; age, 18; male.

Patient had a typical attack and entered the hospital five days after onset, when he showed symptoms of a circumscribed suppurative peritonitis. Operation was at once performed and a large abscess drained. The appendix was not removed. Recovery.

Case 33.—Date of operation, June 25, 1891. Operator, Dr. Murphy. L. M.; male; age, 18. Alexian Brothers' Hospital.

This case was operated on four days after onset of a typical attack. A circumscribed abscess was opened; a fecal stone escaped. The appendix was perforated and was removed after simple ligature. Recovery.

Case 34.—Date of operation, July 28, 1891. Operator, Dr. Murphy. J. A.; male; age, 56; Alexian Brothers' Hospital.

History: Patient entered hospital fourteen days after onset of a typical attack. A large induration in right iliac fossa to be felt.

Operation: Incision into large pus cavity. Appendix not removed; drain. General peritoneal cavity not opened. Circumscribed abscess. Recovery.

Case 35.—Date of operation, August 5, 1891. Operator, Dr. Murphy, Cook County Hospital. A. H.; age, 30; male.

Had an attack six months previous similar to the present. Typical attack July 27. Induration in right iliac region.

Operation: Lateral incision. General peritoneal cavity opened. Peritoneum very much congested. Appendix situated along the lower border of the ileum. Appendix perforated, one side surrounded by a mass of granulations, where it was adherent to the cæcum. The probe could be passed through a small opening into the cæcum, showing where the abscess had emptied. The appendix was ligated and removed. There had been a local gangrene now in the process of cicatrization. Recovery. This is one of the cases that is classed by some authors as cecitis, but the opening in the cæcum was made from without inwards by an accumulation of pus around the gangrenous appendix.

Case 36.—Date of operation, August 10, 1891. Operator, Dr. Murphy, Cook County Hospital. F. D.; age, 32.

Patient was always healthy up to present illness. He was taken ill with severe pain in umbilical region, fever, and vomiting. The pain increased rapidly, and at time of operation was diffuse and uniformly severe.

Examination: Pulse rapid and small; legs drawn up; percussion shows abdomen full of fluid, nearly up to umbilicus; abdominal wall tense; tenderness diffuse.

Operation: Median incision; escape of a large quantity of sero-purulent fluid with fecal odor. Drainage after irrigation of abdominal cavity. Appendix adherent. Patient died on following day.

Post-mortem: Appendix adherent to under surface of cæcum, excepting about one-half inch of tip which was free. At base of appendix was an ulcerated perforation At side of perforation enterolith size of cherry stone. No evidence of a previous abscess cavity. General suppurative peritonitis which had developed before adhesions could take place. The peritoneum of the abdominal and intestinal walls was eroded of endothelium.

Case 37.—Date of operation, September 14, 1891. Operator, Dr. Murphy. Male, G. A.

History: Typical attack.

Operation: A circumscribed intra peritoneal abscess was opened and drained with iodoform gauze. A fecal stone escaped with the pus. Abscess extended deep into back. Recovery.

Case 38.—Date of operation, November 13, 1891. Operator, Dr. Lee. Miss B, age 16.

Sickness commenced with sudden pain in right iliac region, vomiting; sudden rise in temperature to 103°. Induration in right iliac region and tenderness more marked in this locality.

Operation: Drainage of a large circumscribed abscess. Fecal calculus. Appendix not removed. Recovery.

Case 39.—Date of operation, December 14, 1891. Operator, Dr. Murphy. Miss F., age 17.

History: Typical attack.

Operation performed on fifth day after onset. Intraperitoneal pus cavity opened. Fecal stone removed. The appendix was gangrenous and perforated; amputated. Abscess cavity packed with iodoform gauze. Recovery.

Case 40.—Date of operation, December, 1891. Operator, Dr. Murphy. H. F., age 24.

History: For the past three years had had repeated attacks of pain in right iliac region. With the attacks he occasionally had vomiting; always great tenderness in right side.

Status præsens: Patient is emaciated; has evening elevations of temperature and night sweats. For the last three days has suffered from great pain in right iliac region.

Examination: Heart and lungs normal. An area of dullness in right side extending from Poupart's ligament to within 2 inches of the margin of the ribs and as far forward as the *linea similunaris*. The induration extended behind from the crest of the ileum to the margin of the ribs. It was most sensitive and approximated the surface more closely an inch to the right and a little below the anterior superior spinous process. No induration could be felt from the rectum. Urine normal.

Diagnosis: Recurrent appendicitis with extensive infiltration of cellular tissue.

Operation: Lateral incision an inch to the inner side of the spinous process. The cellular tissue was found infiltrated and indurated from a quarter of an inch from the skin. This induration was lacerated with the handle of the scalpel until an abscess was reached 1½ inches below. A small quantity of thin odorless pus escaped. It was found on exploration with the finger that only a sinus had been opened. This sinus was followed upwards and backwards and at the lower end of the right kidney was found a renal calculus, the shape of a maltese cross, the bars being 1 inch in length and three-eighths inch in diameter. It was broken with a heavy forceps and extracted. It had escaped frequently from the kidney and the opening closed, as no urine escaped at time of operation or subsequently. The closure of the opening accounts for the absence of pus in the urine at the time of examination. Patient made an uneventful recovery.

Case 41.—Date of operation, January 10, 1892. Operator, Dr. Hartman. F., male, age 9.

Patient was seen one week after a typical attack, had quite a high temperature with a distinct induration over appendix.

Operation: At time of operation temperature 105°. An intraperitoneal abscess was drained; the appendix was not removed. Recovery.

Case 42.—Date of operation January 26, 1892. Operator, Dr. Murphy. Alexian Brothers' Hospital. J. J. G., age 26, male.

During past two years patient has had about a dozen attacks of appendicitis.

Operation (in intermediate stage): Appendicisectomy. Appendix was adherent to cæcum and showed many cicatrices from previous perforations. Small enterolith. Recovery.

Case 43.—Date of operation, February 20, 1892. Operator, Dr. Lee. Miss D., age 25 years.

Sudden attack of pain in right iliac region. Vomiting. Diffuse abdominal tenderness. Temperature 105°, pulse 130 at time of operation.

Operation third day after attack: Usual incision. Drainage of an intraperitoneal abscess which had previously ruptured and caused a general dry septic peritonitis. Enterolith removed. Symptoms of peritonitis continued and patient died in forty-eight hours. Autopsy not allowed.

Case 44.—Date of operation February 26, 1892. Operator, Dr. Lee, Cook County Hospital. L. J., age 19, female.

Patient was admitted to the gynecological ward of the Cook County Hospital, probably on account of an induration in the roof of the pelvis.

Diagnosis of appendicitis was finally made. She was not operated upon until three weeks after beginning of her attack.

Operation consisted of incision of abscess. General peritoneal cavity not opened, irrigating and packing (with iodoform gauze). Complete recovery in four weeks.

Case 45.—Date of operation March 11, 1892. Operator, Dr. Lee. Male, 18 years, F.

Patient felt perfectly well up to February 28, when, while riding on a bicycle, the pedals of which were too low for his foot, he felt a sudden pain in right lumbar region. Fever soon developed and vomiting occurred several times; bowels constipated. He suffered from great pain above and behind the right anterior superior spinous process of ileum. Excessive tenderness over right side of abdomen, especially in the region of the right anterior superior spinous process. Abdomen very tympanitic. Under anesthetic induration to be felt, which was not apparent before. Temperature 103°.

Operation: Drainage of circumscribed abscess; removal of enteroliths. Appendix not removed. Later fecal fistula developed. Closed itself. Recovery.

Case 46.—Date of operation April 3, 1892. Operator, Dr. Murphy. Female, B., age 52.

Typical attack, nausea, vomiting, local tenderness; no induration.

Operation: Third day after attack; temperature, 102°. Appendicisectomy. Base of appendix very much distended. No adhesions of appendix. A large ulcer in appendix. Drainage forty-eight hours. Recovery.

Case 47.—Date of operation, April 5, 1892. Operator, Dr. Murphy. A. K., age, 26, male. Case occurred in practice of Dr. Davey. Patient was seen seventh day after attack.

Operation: A large abscess was drained without opening general peritoneal cavity. The appendix was not removed. A foreign body was found in abscess cavity. Recovery.

Case 48.—Date of operation, April 5, 1892. Operator, Dr. Lee, Cook County Hospital. Female, M. N., age, 52.

Patient's trouble commenced with chills, fever, vomiting, and general pain in abdomen, which gradually became localized in right iliac fossa. The diagnosis of appendicitis was made and a circumscribed abscess drained. The appendix was not removed. No foreign body present. Patient had a parotid abscess, otherwise an uneventful recovery.

Case 49.—Date of operation April 21, 1892. Operator, Dr. Lee, Cook County Hospital. D. M., age 28.

History: Patient's present illness commenced with a sudden attack of severe pain, vomiting and great tenderness over the epigastrium; had previous good health and no symptoms of pain and distress after taking food. The pain became very intense after a few hours and tympanites set in. The abdomen was uniformly sensitive. No induration could be felt on account of the distention. Temperature 100°; pulse 96. Anxious expression.

Diagnosis: General peritonitis from appendicitis.

Operation: Lateral incision, a general suppurative peritonitis. The appendix was found inflamed in common with the other tissues, not removed. Cause of peritonitis not ascertained. Death twenty-four hours after.

Autopsy: General suppurative peritonitis produced by small round perforating ulcer of stomach. It will be noted in this case that there was absence of increased local tenderness in right iliac region and the pain was located in the epigastrium; also absence of history of ulcer of stomach.

Case 50.—Date of operation, May 10, 1892. Operator, Dr. Murphy. C., age 23, male. Occurred in practice of Dr. Oswald.

History: Sickness commenced with sudden pain in right iliac region, vomiting and nausea.

Examination: Large induration over appendix.

Operation five days after attack; incision of abscess; escape of a large quantity of pus with enterolith; appendix not removed; abscess cavity packed with iodoform gauze; recovery; had one recurrence since, very light; not operated.

Case 51.—Date of operation May 11, 1892. Operator, Dr. Murphy. T. H., age 46, male.

History: Case occurred in the practice of Dr. T. J. Conley; typical attack, induration.

Operation: Drainage of a large circumscribed abscess containing 4 ounces of pus; no foreign body, appendix not removed, general peritoneal cavity not opened; recovery; three recurrences since operation (not operated).

Case 52.—Date of operation May 14, 1892. Operator, Dr. Murphy. Alexian Brothers' Hospital, J. B., age 28, male. Typical attack.

Operation: An extraperitoneal abscess was opened, the appendix removed, also enterolith and the abscess cavity drained with iodoform gauze; recovery.

Case 53.—Date of operation May 18, 1892. Operator, Dr. Murphy. Miss B., age 24.

Present attack commenced May 13, 1892, with general abdominal pain, nausea, and vomiting; induration.

Operation five days after attack; drainage of intraperitoneal abscess containing about 2 ounces of pus; recovery; recurrence July 12, 1893; operated. (See history No. 97.)

Case 54.—Date of operation June 20, 1892. Operator Dr. E. W. Lee. E. B., age 50 years, male.

Seven days before operation patient was suddenly attacked with pain in the abdomen after having partaken of a heavy dinner. A few hours afterwards he vomited, the fever set in (temperature 103°). Abdomen became rapidly distended and tender over the entire surface, more pronounced over the right iliac region. Patient seen on third day by Dr. Lee. Operation advised. Consultation the following morning resulted in postponement of operation. Symptoms continued the same except temperature which fell to 101° and remained so. Further consultation on the seventh day. Operation agreed. Pulse 90, temperature 101° at time of operation.

Operation: Usual incision. General suppurative peritonitis present, result of rupture of a circumscribed abscess around appendix. No limiting adhesions. Bowel at seat of circumscribed abscess black and gangrenous. Appendix not removed. Second day after operation feces discharged freely through the wound. Pulse and temperature good. Third day: Escape of intestinal slough. Patient in good condition. Fourth day: Condition improved. Fifth day: Profuse hemorrhage both from wound and rectum. Patient pulseless. Remained in bad condition and died on seventh day. Autopsy not permitted.

Case 55.—Date of operation, June 25, 1892. Operator, Dr. Murphy. Wiezgoski, Roman, age, 17. Alexian Brothers' Hospital.

History: Typical attack four weeks before operation. Continuation of fever and sweats, with rapid emaciation and tenderness in right iliac region.

Status Præsens: Induration extending half way to the umbilicus; tense and tender; dull on percussion.

Operation: Lateral incision; opened a large circumscribed abscess; general peritoneal cavity not opened; appendix not removed; drainage with iodoform gauze; recovery. This case was re-operated on a second relapse. *(See* Case No. 113.)

Case 56.—Date of operation, July 9, 1892. Operator, Dr. Murphy. Mr. S., age 36 years. Case occurred in practice of Dr. Hoelscher.

History: Typical attack; examination reveals induration and dullness on percussion far beyond median line to the left; operation 28 days after attack; lateral incision; about a quart of pus escaped; no fecal stone; appendix not removed; general septic peritonitis; recovery.

Case 57.—Date of operation, July 16, 1892. Operator, Dr. Murphy, Cook County Hospital. H. W., male, 22 years. Typical attack.

Operation four days after onset: Drainage of a large accumulation of pus (intra-peritoneal); general suppurative peritonitis; appendicisectomy; local gangrene of appendix; no foreign body; drainage; recovery.

Case 58.—Date of operation, July 28, 1892. Operator, Dr. Murphy. Miss R., age 10. Case occurred in practice of Dr. Cotton.

History: Typical attack; nausea, vomiting.

Operation, eighth day after onset: Lateral incision; escape of about 6 ounces of pus from an intra-peritoneal abscess; no foreign body; appendix not removed; recovery.

Case 59.—Date of operation, August 27, 1892. Operator, Dr. Murphy. A. M.; age 22; male; Alexian Brothers' Hospital. Typical attack of appendicitis.

Operation: Lateral incision; circumscribed abscess opened; general peritoneal cavity not opened; appendix not removed; drainage; recovery. This case was operated upon twenty-four hours after admission to hospital.

Case 60.—Date of operation, September 16, 1892. Operator, Dr. Murphy. J. McC.; age, 11; male. Case occurred in the practice of Dr. P. H. Conley.

History: Typical attack.

Operation fifth day after attack: Incision; general peritoneal cavity opened; pus found extending over bowels beyond median line; escape of fecal stone with pus; appendix not removed; temperature at time of operation 99½°; pulse 98°; expression good; recovery in three weeks; *fecal fistula* closed without operation in ten days.

Case 61.—Date of operation, October 11, 1892. Operator, Dr. Murphy. H. S.; male; age, 34.

Admitted to hospital five days previous to operation. Patient gave a typical history of appendicitis; small induration; temperature, 101°.

Operation: Lateral incision; drainage of circumscribed abscess without entering peritoneal cavity; drainage; recovery.

Case 62.—Date of operation, October 15, 1892. Operator, Dr. Murphy. Case occurred in practice of Dr. Hoelscher. Miss F.; age, 16.

History: typical attack.

Operation, three days after onset: Drainage of circumscribed abscess; appendicisectomy; general peritoneal cavity was opened; appendix was perforated, gangrenous, and contained enterolith; recovery.

Case 63.—Date of operation, October 27, 1892. Operator, Dr. Murphy; S.; age, 37; male. Case occurred in practice of Dr. McCarthy.

History: Typical attack; nausea; vomiting.

Operation on sixth day: Large abscess containing about a pint of pus; general peritoneal cavity not opened; appendix enlarged and gangrenous; ligated; amputated; a fecal stone removed; abscess cavity packed with iodoform gauze; recovery.

Case 64.—Date of operation, October 28, 1892. Operator, Dr. Murphy. Alexian Brothers' Hospital. F. R.; age 18.

History: Attack typical.

Operation several days after onset: Lateral incision; general suppurative peritonitis; the appendix and a fecal stone removed; a large quantity of pus escaped; drainage with iodoform gauze. Recovery.

Case 65.—Date of operation, October 28, 1892. Operator, Dr. Murphy; occurred in practice of Dr. Hoelscher. C. F. B.; age 18.

Patient was seen eight days after onset (a typical attack) by Dr. Hoelscher. The temperature was 105°, the pulse 130. Extreme tympanites and general tenderness present. Patient in a profoundly collapsed condition at time of operation.

Operation: Drainage of abdominal cavity; a very large amount of pus escaped (about 1 quart). Death twelve hours after operation. General suppurative peritonitis at time of operation; patient also had pneumonia.

Case 66.—Date of operation, October 28, 1892. Operator, Dr. Murphy, Alexian Brothers' Hospital. H. G.; age, 26; male. Typical attack.

Operation: Lateral incision; general suppurative peritonitis; appendix perforated, gangrenous, non-adherent; appendix removed; drainage; recovery.

Case 67.—Date of operation November 2, 1892. Operator Dr. Murphy. Miss G., age 14.

History: Sudden attack on October 30, 1892, two days before operation, nausea, vomiting and sudden rise of temperature.

Examination: Temperature 102°, pulse 80, local tenderness, tympanites.

Operation: Lateral incision over region of appendix; appendix adherent to side of cæcum and covered with flakes of pus; mesentery also infiltrated with pus; appendix ligated and amputated; appendix found enlarged, adherent, no perforation but ulceration of mucous membrane present; recovery.

Remarks: This case is very interesting as it shows a purulent infection of the peritoneum, and mesentery from an ulcer of the mucous membrane of the appendix without gangrene and without perforation. This peritoneal infection has been reported from ulcers in other portions of the intestinal tract without perforation, but this is the first case on record where such a condition is reported occuring from the appendix without perforation or gangrene.

Case 68.—Date of operation November 3, 1892. Operator Dr. Murphy. Male W., age 36. Case occurred in practice of Dr. O'Malley.

History: Attack typical. Examination revealed a large area of superficial dullness.

Operation eighth day: Incision and removal of appendix; general peritoneal cavity not opened; about a pint of pus escaped, also fecal stone; packing of abscess cavity with iodoform gauze; recovery.

Pathological conditions: Appendix completely gangrenous and free in abscess cavity; nothing being left of it but its peritoneal covering.

Case 69.—Date of operation November 11, 1892. Operator Dr. Murphy. Miss F., age 26.

History: Two days ago patient became very sensitive in right iliac region and noticed there a hard swelling; there had been no perceptible swelling previous to that time; this increased rapidly in size and when admitted to hospital extended up to the margin of the ribs and could be felt distinctly behind; there was no deformity in back, nor was there a history of trouble in the spine; urine normal.

Diagnosis: Appendicitis.

Operation: Laparotomy. Lateral incision; abscess opened without entering the peritoneal cavity; cellular tissues of abdominal wall very much infiltrated; this was due to a rupture of the abscess into retro-peritoneal cellular tissues by an exertion the day before onset of pain; pus was odorless, which immediately caused doubt as to the etiology of the suppuration; exploration of the abscess cavity revealed a sinus leading up to the third and fourth lumbar vertebræ which were tubercular. Rupture of the psoas abscess into the cellular tissue accounts for the sudden onset of symptoms, and the location of and limited disease of the vertebræ accounts for the absence of scoliosis or lordosis; recovery.

Case 70.—Date of operation November 14, 1892. Operator, Dr. Murphy. Case occurred in the practice of Dr. T. J. Conley. Mrs. S., age 24.

History: Typical attack; induration resonant.

Operation fourth day after attack revealed intraperitoneal abscess and perforation of appendix with enterolith; the appendix was amputated; the abscess cavity drained with iodoform gauze; recovery.

Case 71.—Date of operation November 26, 1892. Operator, Dr. Murphy. K., age, 14, male. Case occurred in practice of Dr. O'Shea.

History: Typical attack.

Operation seventh day after onset; a large abscess was opened which contained quite a quantity of blood; after pus escaped, a profuse hemorrhage took place which resembled that of an aneurism; was suppressed by packing with iodoform gauze. A fecal stone was removed; appendix not removed; recovery.

Case 72.—Date of operation November 30, 1892. Operator, Dr. Murphy. Mrs. E., age, 22. Case occurred in practice of Dr. T. J. Conley.

History: Typical attack; operation on the fourth day.

Operation Appendicisectomy: A large circumscribed abscess was present; the appendix was gangrenous and had perforated fecal stone; recovery.

Case 73.—Date of operation December 7, 1892. Operator, Dr. Murphy. Female, S., age, 12 years. Case occurred in practice of Dr. Graves.

History: Typical attack; after four days' operation.

Operation: Intraperitoneal abscess containing 2 ounces of very offensive pus opened; the appendix was found to be partially gangrenous and perforated; was removed; the cavity was packed with iodoform gauze; recovery.

Case 74.—Date of operation December 9, 1892. Operator, Dr. Murphy. J. F., age 25, female. Hospital.

History: Patient had frequently complained of pain in right iliac region and occasionally had pains in back; present attack began two weeks ago with classical symptoms of appendicitis; on examination a considerable induration was found in the right iliac region which appears to be near the surface; no induration could be felt from rectum; superficial dullness on percussion.

Operation: Lateral incision; circumscribed abscess; appendix not removed; general peritoneal cavity opened; drainage; recovery.

Case 75.—Date of operation, December 16, 1892. Operator, Dr. Murphy. St. Joseph Hospital. M. age 28, male.

In year previous to operation the patient had three attacks of local peritonitis; during the last attack Dr. F. S. Hartmann saw the case and advised operation. The last attack simulated intestinal obstruction very much, so that there was doubt as to the actual diagnosis.

Operation: General peritoneal cavity opened; appendicisectomy; there was present a perforation of the appendix with a circumscribed abscess in region of umbilicus; the cæcum coiled forwards around appendix; drainage; patient made a good recovery.

Case 76.—Date of operation December 16, 1892. Operator, Dr. Murphy. A., age 26, male. Occurred in practice of Dr. Wittwer, Alexian Brothers' Hospital. Patient was seen several days after onset of attack and showed severe symptoms of general suppurative peritonitis.

Operation: The usual incision was made and a large quantity of pus escaped which covered the bowels for an area of several inches; slow recovery.

Case 77.—Date of operation December 25, 1892. Operator Dr. Murphy.

Case occurred in practice of Dr. Mott. Two weeks previous to first operation patient had a typical attack accompanied with pain, nausea, vomiting and tympanites; on examination a dullness on light percussion over entire abdomen below the umbilical line; deep percussion resonant.

Operation: Lateral incision, large quantity of pus all over the bowels; appendix not removed; temperature dropped for three days and then again rose to 103°; January 2, consultation with Dr. Mott; it was found that left side of abdomen was not drained properly; accumulation of pus in that region; the abcess was drained; it was found that this abcess extended into the pelvis; patient made a rapid recovery.

Case 78.—Date of operation January 28, 1893. Operator Dr. Murphy. K., age 22, female.

Sickness commenced with sudden pain and tenderness in right iliac region; at operation, which was performed four days after onset of attack, a large extraperitoneal abscess was found which was packed with iodoform gauze; the appendix was not removed; two weeks after the operation a lobar pneumonia set in which was followed by a hydrothorax; aspiration; recovery.

Case 79.—Date of operation, February 17, 1893. Operator, Dr. Murphy. R., age 32, male.

Case occurred in practice of Dr. Turk. Ten days previous to operation sudden attack of pain and tenderness in right iliac region. Difficult urination. No induration.

Operation: Lateral incision and removal of appendix. General peritoneal cavity opened. The appendix was adherent to its surroundings, a fecal stone was removed and a perforation of the appendix had taken place. Local gangrene of appendix. Gauze drainage. Recovery.

Case 80.—Date of operation, February 17, 1893. Operator, Dr. Murphy. Cook County Hospital, W. C., age 16, male.

Recurrent appendicitis. Three attacks previously. Typical attack, no induration.

Operation: Lateral incision. No temperature at time of operation. General peritoneal cavity opened. Appendix situated in the retro-cæcal fossa, adherent, very much enlarged and œdematous, ligated and amputated. No pus in peritoneal cavity. Drainage. Recovery.

Pathological conditions: Mucous membrane ulcerated, very much swollen around the ulcer. Tension on serous covering great.

Case 81.—Date of operation, March 9, 1893. Operator, Dr. Hartman. Male, B., age 9.

Patient's illness began one week previous to operation. Sudden abdominal pain, nausea, vomiting, diarrhea, fever. Abdominal tenderness more pronounced locally. Induration.

Operation: Drainage of an intraperitoneal abscess. Recovery.

Case 82.—Date of operation, March 12, 1893. Operator, Dr. Wittwer. W., age 8. male.

Case occurred in practice of Dr. Hicks, of Burlington, Wis. About two weeks before operation patient commenced ailing with an irregular temperature, sweats, occasional vomiting, and later on pain in lower part of abdomen, with a tendency to localization in right inguinal region Examination of urine revealed pus Induration.

Diagnosis: Large circumscribed perityphlitic abscess with rupture into bladder.

Operation: Median incision 2 inches above pubic symphysis; a large quantity of pus escaped which had involved the whole right iliac region. Two large rubber drains inserted. Complete recovery in four weeks. Appendix was not removed.

Case 83.—Date of operation, March 20, 1893. Operator, Dr. Lee. R., age 13, male. Case occurred in the practice of Dr. P. B. Hayes. Onset sudden, vomiting, pain in right iliac region, extreme tympanites, no induration. At time of opertion, temperature 105° F., pulse 134; had been so for three days. Typical typhoid condition.

Operation: Appendicisectomy: Drainage, no peritonitis. Appendix unusually long and swollen, contained some blood and pus; not perforated; mucous membrane ecchymotic and ulcerated. Temperature fell promptly after operation to 102° F.; on the third day patient became deeply jaundiced. Rapid recovery.

This is a particularly interesting case, the temperature keeping above 105 and the pulse 134 from the beginning of the attack up to the time of operation. Abdomen enormously tympanitic and tender. He presented all the so-called classical symptoms of general septic peritonitis. Note the pathological conditions, no peritonitis, simple infection with retention in appendix. How could a diagnosis of the pathological conditions be made by these symptoms?

Case 84.—Date of operation, March 30, 1893. Operator, Dr. Murphy. Male, M. L., age 22, Cook County Hospital.

History: Patient was transferred from medical division of hospital after having been sick for five days. Five days previous to operation patient was taken with severe pain in right iliac region. Large doses of morphine were necessary to control the pain. Bowels moved as usual. Patient had noticed no swelling.

Examination: On examination abdomen tympanitic, severe pain on slight pressure over the appendix; no tumor visible nor palpable; no difference in percussion resonance. The pain increased constantly from the beginning. March 29, 1893, pulse 120, temperature 103.4°, respiration 42. March 30, 1893, morning pulse 132, temperature 102.2°, respiration 36.

Operation: Lateral incision; peritoneum opened, packed around seat of operation. Retro-cæcal abscess; 1 ounce of pus. Appendix amputated, no foreign body or calculus. Sutures inserted but not tied. Drained with iodoform gauze. In twenty-four hours pulse had subsided to 96, temperature 97°., respiration 28. Subsequently convalescence uneventful.

Case 85.—Date of operation, April 6, 1893. Operator, Dr. Murphy. Mrs. S., age 30 years.

Onset of typical attack April 2, 1893. A temperature of 103°, and a pulse of 92 was present at time of operation. Increased local pain and general tympanites.

Operation: Lateral incision. Appendix invaginated in a fold of the cæcum. A couple of drams of very offensive pus around it. Appendix was ligated near its base, amputated. Drainage. Recovery. Appendix had no perforation. An ulceration was the cause of the infection. The mesentery was infiltrated with pus and there were flakes of pus on the surface of bowel in the region of infection. This is another illustration of local suppurative peritonitis from ulcer of the appendix without perforation.

Patient had a temperature of 103° every day after operation for three weeks without any other symptom of sepsis or local trouble; as she expressed it "one of her regular bilious attacks." It annoyed me very much, but no other explanation for temperature could be given. Recovery.

Case 86.—Date of operation, April 6, 1893. Operator, Dr. Wittwer. B. L., age 10 years, school girl.

History (as given by Dr. Wittwer): Patient was brought to my office two days before operation. Mother gives the following history: For the last two weeks child has been ailing; complained of pain all over body, principally in abdomen around umbilicus. Child gradually lost flesh, her appetite failed, she had some diarrhea, occasional vomiting, so that finally a physician was called who treated her several days for rheumatism. When I saw her she had some temperature, cheeks flushed; walked into office like a case of hip joint disease. Right leg drawn up in recumbent position.

Examination revealed a narrow induration about 3 inches long in the right iliac region. An operation was made two days later (April 6, 1893), and the following conditions were found.

Operation: Typical incision, appendix easily located and found adherent to surrounding tissues; some flakes of pus could be seen on outside of appendix, but no distinct accumulation of pus had formed. Appendix was ligated and removed, suture left in wound and latter packed with iodoform gauze.

Pathological conditions: Fecal stone. On opening appendix it was found that one-half of mucous membrane toward the cæcum was thickened and infiltrated but not gangrenous, while the distal portion of mucous membrane had become gangrenous and presented the appearance of a diphtheritic patch, ulcerated with a dirty, thick, grayish, yellow base. There were present in appendix a few drops of pus. Recovery.

Case 87.—Date of operation, April 9, 1893. Operator, Dr. Murphy. Miss W., age 12 years. Case occurred in practice of Dr. T. J. Conley. Typical attack.

Examination: Induration with resonance on percussion, tenderness general. Temperature at time of operation 99°, pulse 96.

Operation: Lateral incision into general peritoneal cavity, escape of about 1 quart of pus. No foreign body to be felt. Appendix was not removed. General suppurative peritonitis. The coils of intestines were covered with a thick layer of fibrin which I believe accounts for the absence of absorption and toxic symptoms. Recovery.

Case 88.—Date of operation, April 21, 1893. Operator, Dr. Murphy. Mrs. I, age 24.

Case occurred in practice of Dr. Heartler. Present illness commenced with sudden general abdominal pain and vomiting; fever. Examination, tenderness over appendix. Induration.

Operation on fourth day after attack: Lateral incision into peritoneal cavity; circumscribed intraperitoneal abscess; appendix removed; drainage. Recovery. An extensive gangrene of the appendix was present but no perforation.

Case 89.—Date of operation, May 6, 1893. Operator, Dr. Murphy. R. C., age 13, male.

Case occurred in practice of Dr. McKee. Patient was sick one month before seen by operator. Onset typical; examination, large induration extending over lower half of abdomen. Tympanites; tender. Patient very much emaciated and cachectic. Temperature normal.

Operation: Abdomen opened at most prominent point of induration, which was to the left of the median line. Appendix not removed; drainage. Recovery. A general suppurative peritonitis was present. The intestines were covered with a layer of fibrin.

Case 90.—Date of operation, May 13, 1893. Operator, Dr. Murphy. Alexian Brothers' Hospital. H. S., iron worker, age 26.

Patient had first attack about two and one-half years ago which came on suddenly while riding in a street car; the sudden pain commenced in the right iliac fossa and soon spread over the entire abdomen. Patient had always had more or less tenderness over the appendix since this time and had had quite a number (24) of similiar attacks at intervals of five to six weeks. The attacks consisted of pain in right iliac region, vomiting, nausea, slight chills and fever. Bowels have always been kept regular by use of cathartics. During the attacks there has always been a desire to micturate, which persisted until attack subsided. This attack has been more severe than any other. Herpes zoster in right iliac region.

Operation: Appendicisectomy and drainage. Time four and one-half minutes. Temperature after operation always below 100°. Recovery.

Case 91.—Date of operation, June 3, 1893. Operator, Dr. Murphy. Mr. K., age 22. (Was operated upon five months previous. *See* case 78.)

Recurrent attack; patient sick five days.

Operation: Lateral incision. Intraperitoneal abscess; appendicisectomy. Enteroliths. Drainage. Recovery. Appendix was perforated and showed local gangrene.

Case 92.—Date of operation, June 4, 1893. Operator, J. B. Murphy. C. H., male, age 28.

Patient was taken sick May 31, 1893, with moderate pain in abdomen, which gradually became worse and localized in lower half. Nausea, vomiting on the second day, pain became localized in the right iliac region and gradually increased. In the evening of the third day he experienced a sudden severe pain accompanied by a sensation as if something had ruptured within the abdominal cavity.

Examination: Tenderness, induration, and dullness in right inguinal region.

Operation: Appendicisectomy. Intra-peritoneal abscess incised; fecal stone escaped with pus. Fecal fistula followed operation, which lasted for ten days. Temperature ranged up to 101.5° after operation. Recovery. Subsequent examination showed protrusion of abdominal wall, a small hernia.

Case 93.—Date of operation, June 5, 1893. Operator, Dr. Murphy. Alexian Brothers' Hospital. P. H., male, age 30.

History: About six years previous to operation patient was attacked with severe pain in the abdomen, followed by nausea and vomiting. The pain was very intense for five hours; then the fever set in. Had had a dozen similar attacks since then. Was drowsy and sleepy the day before each time.

Examination, sixth day after onset: Lateral incision. General peritoneal cavity opened. Appendix adherent; removed. Fecal stone. Drainage. Recovery. For twelve days after operation temperature remained below 100°. On sixteenth day rose to 103°, but fell to normal shortly.

Case 94.—Date of operation, June 16, 1893. Operator, Dr. Murphy. F., male, age 18. Woodstock, Ill.

Case occurred in the practice of Dr. L. C. Waters. Sickness began five days ago with a typical attack.

Examination: Induration, local tenderness, temperature 99.5° at the time of operation.

Operation: Lateral incision, intra-peritoneal abscess, appendix adherent, removed. Drainage. Recovery.

Pathological conditions: Fecal stone, local gangrene of appendix, perforation.

Case 95.—Date of operation, June 16, 1893. Operator, Dr. Murphy. M. M. G., male, age 13.

Case occurred in practice of Dr. P. H. Conley. Illness began June 9 with sudden pain and tenderness in abdomen; this was soon followed by vomiting and fever. This condition lasted until time of operation. General tympanites. Circumscribed induration in right iliac region; local tenderness. Temperature before operation, 102° F.; pulse, 110.

Operation: Lateral incision. Large intra-peritoneal abscess. Appendicisectomy. No foreign body. Drainage. Appendix ulcerated, not perforated.

Case 96.—Date of operation, July 8, 1893. Operator, Dr. Murphy. W. F., male, age 16.

Case occurred in the practice of Dr. W. H. Bonton. Commenced with sudden attack in right iliac region, extending all over abdomen. Fever. Slight induration, which was more pronounced under anæsthesia, and under the influence of the latter appendix could be outlined.

Operation: In attempting appendicisectomy, the ligature, which was tied around the base of the appendix, was cut through. No further attempt at ligation was made; intra-peritoneal abscess at seat of operation drained; appendix slightly adherent, adhesion easily separated owing to a complete gangrenous condition of appendix, which also accounted for ease with which silk tore through in attempting ligation. Appendix not perforated. Fecal fistula on third day, which closed in thirteen days. Temperature subsided immediately after operation. Recovery.

Case 97.—Date of operation, July 12, 1893. Operator, Dr. Murphy. Female, age 26. Miss B.

Patient had a typical attack on the 9th of July, 1893, three days before operation; had pain, vomiting, tenderness, temperature, and slight induration.

Operation: Incision and removal of appendix. About an ounce of pus escaped, which was of very offensive nature. Drainage. Recovery. The appendix showed perforation on its side near the base. No foreign body. Cicatrix showed seat of previous perforation. This case was operated upon May 12, 1892. Simple drainage of abscess.

Case 98.—Date of operation, July 18, 1893. Operator, Dr. Murphy. Mrs. N. Age 24.

Case occurred in practice of Dr. Hoelscher. Present illness began five days before operation, with severe vomiting and slight pain in right iliac region. The vomiting persisted up to time of operation, regardless of treatment. No induration, no local tenderness, no temperature. Pulse 120, anxious expression.

Operation: Lateral incision. General peritoneal cavity opened. No peritonitis. Cæcum drawn over toward uterus and firmly held there by the appendix, which was adherent to uterus, and produced intestinal obstruction. Appendix removed. Twenty-four hour drainage. Rapid recovery. Appendix very much elongated, contained no pus, ecchymotic at the end where it was adherent to uterus. This case is very instructive, as the symptoms correspond exactly with the pathological conditions and did not suggest acute appendicitis but intestinal obstruction, and is the only case in which there was an absence of pus or cicatrices showing the previous existence of pathological conditions.

Case 99.—Date of operation, July 18, 1893. Operator, Dr. Murphy. I. D., male, age 56. Alexian Brothers' Hospital.

Four weeks ago patient experienced a sudden attack of severe pain in right half of abdomen. Progress of disease characterized by a dull heavy aching pain in right groin and hip. Patient jaundiced since commencement of attack. Stools normal. Difficulty in micturition. Great tenderness on palpation in right iliac region. Induration. Patient is unable to completely extend right thigh.

Operation: Drainage of a large circumscribed abscess containing about three pints of pus. Appendix situated behind the cæcum, not removed. Drainage. Recovery.

Case 100.—Date of operation, July 23, 1893. Operator, Dr. Murphy. Mrs. C., age 25.

Patient was attacked on July 19 with severe pain all over abdomen; the pain was more severe over right side. Pain was accompanied with nausea and vomiting, which continued up to time of operation. Temperature July 19, 103°, pulse 96; 20th to 23d temperature 102°, pulse 90. Abdomen enormously distended, dull on the lower half.

Operation: Lateral incision; a quart of pus of sero-purulent nature escaped from the general peritoneal cavity which covered the bowels to a great extent. Drainage. Recovery.

Case 101.—Date of operation, July 24, 1893. Operator, Dr. Murphy. T. S., male, age 25. Alexian Brothers' Hospital.

Recurrent, twelve attacks during the past five years, lasting from three to ten days.

Operation: Appendicisectomy in immediate stage. Drainage. Recovery. Appendix extensively adherent; mucous membrane ecchymotic. Marked stricture in middle of appendix, resulting from cicatricial contractions of former ulcerations.

Case 102.—Date of operation, July 25, 1893. Operator, Dr. Murphy. J. H., age 14, male.

Case occurred in practice of Dr. Quine. Patient had a typical attack of appendicitis two weeks previous to the operation, accompanied by fever, local tenderness, induration. The temperature subsided on the tenth day to normal and remained so for three days, when it gradually began to increase, and by the thirteenth day reached 102°. The area of induration increased rapidly and was somewhat tender. On the fourteenth day there was a large induration of the right iliac region. Pulse and temperature both good.

Operation: Lateral incision into an abscess. General peritoneal cavity not opened. There was no pus when the abscess was opened, as is usually the case, showing an absence of tension in the abscess. There was considerable fresh blood in the abscess cavity. Two fecal stones. No effort made to locate or remove the appendix. Drained. After recovering from the anæsthetic the patient collapsed and died fourteen hours after operation. The course of this case after the operation indicated that the abscess ruptured between the coils of the intestine and the pus emptied into the peritoneal cavity before the incision was made, explaining the reason why pus did not escape when abscess wall was opened as well as the hemorrhage into the abscess. This opening was not detected at the time of operation, nor could it be seen that the pus escaped into the peritoneal cavity, as that was not opened beyond the line of adhesion. This also accounts for the collapse of the patient, as the symptoms were those of fatal sapræmia.

Case 103.—Date of operation, July 26, 1893. Operator, Dr. Murphy. Case occurred in practice of Dr. Rohr. F. O., age, 43; male.

A week before operation patient was suddenly attacked with pain in right iliac region, followed by vomiting, nausea, and tympanites; pain and tenderness all over abdomen, especially in lower half; temperature, 99½° at time of operation; pulse, 100.

Operation: Lateral incision; general peritoneal cavity opened; a general dry septic peritonitis present; appendix situated behind cæcum; very difficult to locate; the adhesions around the same were loosened and the appendix removed. The appendix was large, gangrenous, and showed perforation, through which a fecal stone projected. Iodoform gauze drainage. I desire to call your attention especially to the fact that this patient was not collapsed at the time of the operation; that his temperature was 99½° and his pulse 90, notwithstanding that he had a general septic peritonitis involving all of the abdominal viscera, and had it for some time previous to operation. Death twenty-four hours after operation.

Case 104.—Date of operation, July 27, 1893. Operator, Dr. Murphy. M. O'C., age, 22, male.

Patient suddenly attacked with pain in region of right kidney; extreme tenderness over appendix, extending high up above crest of ilium and up to margin of ribs behind, but not in front; no tympanites until morning of attack. At 4 a. m. on the day of operation felt the abscess rupture; a sudden bursting in his abdomen, followed by great pain and depression.

Operation four days after attack: Incision; appendix difficult to locate; an abscess cavity was found and the appendix formed a part of its wall. It was gangrenous; had ruptured and located behind cæcum. Two fecal stones were removed. There was present a dry septic peritonitis, the result of the rupture of the abscess the morning before the operation. The intestines were denuded of their endothelium, and flakes of pus and some sero-purulent fluid rested between the coils. The operation was refused for 48 hours preceding the rupture of the abscess, and the delay cost the patient his life. Death, thirty-six hours after operation, of sapræmia.

Case 105.—Date of operation, July 28, 1893. Operator, Dr. Murphy. T., age, 18, male.

Case occurred in practice of Dr. Berry. Patient complained of abdominal pain and vomiting on the night of the 24th; called the doctor on the evening of the 25th; temperature at this time 103°, pulse 120; 26th, a. m., temperature 102°; tympanites increased, pain diminished; 27th, p. m., temperature 101°, pulse 100.

Operation: Lateral incision; circumscribed abscess; general peritoneal cavity not opened; fecal stone escaped with pus; appendix removed; drainage; recovery.

Case 106.—Date of operation, July 28, 1893. Operators, Drs. Murphy and Dr. Le Count, house surgeon. J. M.; age, 32; male.

Patient's trouble began twelve days before entrance to hospital with severe pains in abdomen, accompanied by vomiting. Later on a dull aching pain developed in the right iliac fossa which was persistent; vomiting continued a little every day until day of operation; could keep nothing on stomach. Bowels moved daily. No chills, no fever. Later on an induration became visible in right iliac region.

Operation: Usual incision; general peritoneal cavity not opened; escape of 8 to 10 ounces of purulent, fecal-smelling pus. Digital examination of pus cavity

detected sacculated condition, which was broken down and made into single cavity. Packed with gauze. Upper part of wound sutured with silk. Patient made rapid recovery.

Case 107.—Date of operation, July 31, 1893. Operator, Dr. Murphy. A. J.; age, 22; female.

Case occurred in practice of Dr. P. H. Conley. Patient had a previous attack about a year before operation, but not as severe as present one. Sudden attack July 24, 1893. Pain in right iliac region; nausea; vomiting; tympanites; induration; dullness on percussion.

Operation: Lateral incision; extensive suppurative peritonitis extending into Douglas's pouch and up behind the cæcum and colon to the kidney; drainage; recovery.

Case 108.—Date of operation, August 5, 1893. Operator, Dr. Murphy. R. W.; age, 18; male. Alexian Brothers' Hospital.

History: Patient had a previous attack June 25, 1892, for which he was operated; simple drainage (see case 55). Had a second attack in August, 1892, which only lasted a few days. This present attack (third) began with sudden pain in the abdomen, caused by straining himself while working at his lathe. The pain and vomiting were so severe that he was compelled to go to bed. At first pain was located in right iliac region, but in a few hours it extended over the entire abdomen.

Examination: The temperature reached 102° fifteen hours after the onset, and he presented himself for operation thirty-one hours after onset. Temperature, 99.7°; pulse, 80; tympanites; general abdominal tenderness; dullness on superficial percussion on lower half of abdomen.

Operation: Lateral incision; general peritoneal cavity opened; found full of a thin purulent fluid. The wall of an old circumscribed abscess was seen, in which was detected a small opening. On opening the wall extensively half of the appendix was found to protrude into it. The appendix was very much enlarged, thickened, and at its tip an enterolith protruded. This condition had existed for a long time, as could be seen from the pathological condition of the opening. Although the peritoneum of the intestine and omentum was congested, it still retained its gloss and was not eroded of its endothelium. Appendix ligated, amputated; recovery.

Remarks: The cause of the peritonitis in this case was the rupture of a circumscribed abscess that had existed since the previous August, or the time of the second attack. The wall of the abscess was very firm. It will be noted that while the general suppurative peritonitis was present at the time of the operation and had existed for thirty-one hours, the patient was not collapsed; his temperature was only 99.7° and his pulse 80.

Case 109.—Date of operation, August 8, 1893. Operator, Dr. Murphy. J. J. D.; age, 23; male.

Present attack began July 28 with sudden pain in the region of the umbilicus which rapidly localized itself in the right iliac region. Marked induration over appendix. Temperature 102° day before operation. Has vomited several times since the onset of attack. Temperature on morning of operation 100°.

Operation: Lateral incision; general peritoneal cavity opened; circumscribed abscess found which contained half a pint of pus; appendix amputated; drainage; recovery.

Pathological conditions: Appendix enlarged; local gangrene with perforation; no foreign body.

Case 110.—Date of operation, August 17, 1893. Operator, Dr. Murphy. Patient occurred in practice of Dr. Pigall. R. S. B.; age, 33; male. Post-Graduate Hospital.

Patient was kicked, on July 31 by a man, in the right side. The same night at 2 o'clock he was attacked with sudden pain in the right iliac region, followed by fever, tenderness, and tympanites. These symptoms continued up to time of operation.

Examination: Large tumor in right iliac region, extending almost to umbilicus; no fluctuation could be determined; no œdema or redness of the wall; dull on percussion, both superficial and deep. A differential diagnosis was made between rupture of kidney, rupture of cæcum and appendicitis in favor of the latter.

Operation: Lateral incision; abscess wall adherent to anterior wall of abdomen; general peritoneal cavity not opened; abscess circumscribed, drained; appendix not removed; recovery.

Case 111.—Date of operation, August 22, 1893. Operator, Dr. F. S. Hartman. A. K.; age, 18; female.

Primary attack: Sickness began with colicky pain in region of stomach, followed by nausea and vomiting. Later pains extended to lower part of abdomen. The following day fever appeared and the pain increased. Two days later patient felt about recovered from her attack and went about as usual. During the afternoon of this day a second severe attack developed with pain, nausea, vomiting, etc. The following day she felt perfectly well, but a third similar attack occurred later in the

day. She was first seen on this day. Pulse, 114; temperature, 104. Large induration in right iliac region.

Operation on third day: Drainage intraperitoneal abscess, containing about 3 ounces of pus; 3 fecal stones removed; appendix not located; gauze drain; fecal fistula; recovery.

Case 112.—Date of operation, August 25, 1894. Operator, Dr. Murphy. Male; F. H. C., of Buffalo; age, 28.

Case occurred in practice of Dr. J. C. Cook. Appendicitis began on morning of 24th, at 7 a. m., with sudden attack of pain in right iliac region, followed by nausea and vomiting; tenderness all over abdomen; very sensitive on deep pressure in right iliac region; abdomen tympanitic, induration. Nine a. m., August 25, pulse 96, temperature 98.3; 8 p. m., August 25, pulse 100, temperature 102°; 11 p. m., August 25, pulse 120, temperature 103°.

Operation: 11:30 p. m., Lateral incision; peritoneal cavity opened; no adhesions to anterior wall; appendix situated in front of cæcum surrounded by omentum; appendix gangrenous, showed no perforation; two drams of pus outside of the appendix, which was amputated; enterolith in appendix; drainage; recovery.

Remarks: Instructive in showing purulent infection of peritoneum; (two drams of pus) without perforation.

Case 113.—Date of operation, August 28, 1893. Operator, Dr. Murphy; Alexian Brothers' Hospital. P. McG.; age, 27; male.

Patient was taken with typical attack three days before operation. In spite of the very severe pain he worked the whole of the first day. The pain at first was general, but gradually was localized in right iliac region. There was marked muscular resistance, but no perceptible induration over appendix.

Operation: Temperature at time of operation, 100.8°. Lateral incision; appendix situated 2½ inches below the umbilicus and near the median line; circumscribed abscess, small, no adhesions to anterior wall; adhesions to omentum; appendix perforated; fecal concretion; appendix excised; simple ligature of base; drained; recovery. Temperature no time after operation exceeded 100.4°.

Case 114.—Date of operation, August 28, 1893. Operator, Dr. Murphy. Mrs. C.; age, 52. Occurred in practice of Dr. Cauley.

Attack began six days before operation with typical symptoms. A general suppurative peritonitis existed before operation. The operation showed that a circumscribed abscess existed and had ruptured.

Operation: Temperature at time of operation, 104°; pulse, 120. An incision was made and the abdominal cavity drained; appendix removed; gall bladder elongated and adherent to abscess wall. Patient died three days after operation of sapræmia; no autopsy.

Case 115.—Date of operation, August 31, 1893. Operator, Dr. Murphy. Male; R. H.; age, 16.

Case occurred in practice of Dr. J. C. Cook. Patient was suddenly taken sick at Waukegan (August 29) with nausea and vomiting, severe pain in right iliac region. Patient had been eating grapes the day before (August 29). Temperature August 31, 101°.

Operation, thirty-nine hours after onset of symptoms: Lateral incision; appendix completely surrounded by omentum at least half an inch thick except at tip, where only the thin gangrenous peritoneal wall of appendix separated the pus in the appendix from the peritoneal cavity.

This whole mass was ligated, amputated; a drain of iodoform gauze inserted. Silkworm gut was used to ligate the appendix; this had to be removed, as it did not slough off or was not absorbed.

Case 116.—Date of operation, September 19, 1893. Chas. B.; age, 11. Operator, Dr. Hartmann; Post-Graduate Hospital.

History: Patient was taken sick in the morning of September 16, 1893, with dizziness and headache. Went to bed at noon; slept; on awaking at 3 p. m. dizziness and headache had increased and he had developed a fever and backache; diarrhea and griping present. The following day, September 16, vomited freely; high fever. September 17, 6 p. m., pulse 150, temperature 105°; typhoid condition; abdomen somewhat tympanitic, general tenderness. September 18, a. m., pulse 135, temperature 105°; general conditions same; abdominal tenderness more marked in right iliac region; no induration, but slight nodules could be felt in this region, which at time of operation proved to be swollen mesenteric glands.

Operation: Appendicisectomy, small iodoform gauze drain; sutured. Appendix was nonadherent; external appearance normal except the end, which was somewhat swollen; was of rather unusual length. Upon being opened was found to contain a grape seed and was ulcerated.

Recovery; ventral hernia; latter resulted from wound opening during a severe attack of typhoid fever which immediately followed the operation.

Case 117.—Date of operation, September 24, 1893. Operator, Dr. Murphy. K. S.; age, 50; male.

Case occurred in practice of Dr. Venn. Patient has had a number of attacks. Present attack began about seven days ago, with severe local pain at umbilicus, nausea, vomiting, fever, tympanites.

Status Præsens: Large induration in right iliac region, dull on superficial percussion, resonant on deep percussion. No oedema of wall. Temperature 101°, pulse 90 at time of operation.

Operation: Lateral incision, abscess opened without opening the unaffected portion of peritoneum. Abscess circumscribed. Appendix not removed; drain, recovery.

Case 118.—Date of operation, September 24, 1893. Operator, Dr. Murphy. H. C.; age, 22; male.

Case occurred in practice of Dr. O'Malley. Date of attack September 13, beginning with pain in umbilical region, followed a few hours afterwards by vomiting. On September 15 temperature 105°. On September 16 temperature normal, and remained so up to day of operation. September 24, 1893, 8 a. m., pulse 104, temperature 99°. The induration extended to the median line as high as umbilicus and within three inches of ninth costal cartilage. Resonant on deep percussion and flat on light percussion over that area.

Operation: Later incision; abscess circumscribed, i. e., the abscess was opened directly through the abdomen without disturbing the uninfected portion of the peritoneum. Appendix not removed; drained, recovery.

Case 119.—Date of operation, September 27, 1893. Operators, Drs. Oswald and Oswald, Alexian Brothers' hospital. W. McK.; age, 15; male.

Six months previous the patient had been operated upon for general suppurative peritonitis following appendicitis. The abdomen had been drained, appendix not located. The wound healed nicely, but has opened and discharged pus three times since the operation. The present operation was performed for the purpose of removing the sinus and determining the cause of the same.

Operation: Incision 2 inches to the inner side of the opening. Peritoneal cavity opened; cæcum found adherent to the lateral perietal wall; the end was considerably distended. The cavity of the appendix shut off from the cavity of the cæcum by a large cicatrix. There were three openings into the appendix. The cicatricial occlusion of the base of the appendix accounts for the recurrence of the attacks. Appendix removed. The opening in the side of the appendix was connected with the opening in the abdominal wall. Drain. Recovery.

Case 120.—Date of operation, September 28, 1893. Operator, Dr. Murphy. Male; F. B.; age, 35. Occurred in practice of Drs. McKee and Pigall.

History: In the night of September 21 patient was attacked with severe abdominal pain. This was shortly followed by nausea and vomiting. The following morning patient's temperature was 102°. Vomiting and pain continued during the following seven days. The patient became very tympanitic and rapidly lost strength.

Examination: Septemper 28, patient's facial expression bad; skin cold, gulping every few minutes. Abdomen extremely distended. Dull on light percussion over lower half. Temperature, 101°; pulse, 135.

Operation: Lateral incision, abdomen full of sero-purulent fluid; endothelium of the intestines eroded. The appendix was easily located and removed; adherent, gangrenous, and perforated; drained. Death thirty-six hours after operation of sapræmia.

Case 121.—Date of operation, October 2, 1893. Operator, Dr. Hartmann. E. S.; male; age, 32.

History: Evening of September 30 patient experienced abdominal pain, which was relieved by an anodyne. The following morning pain returned, but patient went around as usual. In the evening pain became very severe, and during the night was so intense that hypodermic injections were given. October 2, a. m., pulse 95 and strong; at noon pain became somewhat localized in the right iliac region; at 4:30 had a very severe chill.

Examination, 6:30 p. m.: Tympanites; general abdominal tenderness, more marked in lower portion of abdomen and right iliac region; induration in the latter location.

Operation: Appendicisectomy; drainage of local septic peritonitis; appendix gangrenous, perforated, containing enterolith; adhesions of bowel to peritoneum; limited septic process above and to the inner side of incision; toward the pelvis no adhesions were to be felt. Patient died on October 4.

Post-mortem revealed presence of general septic peritonitis; folds of intestines were agglutinated and presented many pockets of suppuration.

Case 122.—Date of operation, October 12, 1893. Operator, Dr. Murphy, Alexian Brothers' Hospital. Ed. B.; age, 21; male.

Onset October 7, 1893, with intense abdominal pain, more severe in right iliac region. Treated "expectantly" for one week. Was up and about after the first few days. Vomiting continued at intervals from beginning of the attack. Patient collapsed two days prior to admission to hospital, and when admitted in very bad

condition; respiration irregular, almost entirely thoracic; pulse feeble and rapid; temperature 102°; general pain and tenderness, with tympanites all over abdomen; induration not palpable, most sensitive in right iliac region.

Diagnosis: Appendicitis; perforation; general suppurative peritonitis.

Operation: Lateral incision; about a pint of pus escaped. Appendix perforated, firmly adherent, not removed. No limiting adhesions; pus distributed throughout the entire peritoneal cavity. Strands of gauze placed in all directions. No irrigation. Hypodermic injections of strychnine sulphate, grain $\frac{1}{15}$ every hour. Patient rallied completely in forty-eight hours. Temperature dropped to 99° and remained so; he improved rapidly until October 22, when he was attacked with a double pneumonia, and died October 24, 1893. All of his abdominal symptoms had subsided before the attack of pneumonia began; the drainage, however, had not been removed. I have placed this in the list of recoveries, as I believe the cause of death was independent of his peritonitis. This is one of the very few cases that rallied from the collapse of general supurative peritonitis.

Case 123.—Date of operation, October 14, 1893. Mary S., 11 years. Operator, Dr. Hartmann.

History: On October 8, immediately after dinner, patient vomited very freely; the rest of the day felt as well as usual. During the night she again vomited. Felt quite well on awaking following morning, October 9. During the afternoon developed pain in region of navel, which was relieved by hot applications. October 11, in awaking, felt quite sick, intense pain in abdomen, almost constant; remained in bed; during the night developed a fever which continued until the time of operation.

Operation: Appendicisectomy; small iodoform drain; suture; appendix swollen and mucous membrane gangrenous.

Case 124.—Date of operation, October 23, 1893. Operator, Dr. Hartmann. Mrs. M. O. B., age 27, at Post-Graduate Hospital.

Since May, 1882, had ten attacks; always suffered with intense colicky pains in epigastrium, accompanied by vomiting of bile. The attacks occurred mostly during the night, and came and disappeared suddenly. October 21, 6 p. m., patient experienced persistent colicky pain in epigastrium, accompanied by persistent vomiting, lasting until 4 o'clock the following day, when, after having ceased for a couple of hours, returned again. First complained of pain in right iliac region during afternoon of 22d; chills in afternoon of same day.

Examination: No tympanites, slight induration, tenderness confined to the right iliac region.

Operation: Drainage of local septic peritonitis, appendicisectomy. Appendix gangrenous, perforated, adherent. Recovery.

Case 125.—Date of operation, October 23, 1893. W. E.; age, 24; Alexian Brothers Hospital. Operator, Dr. Murphy.

History: Patient admitted to medical ward of hospital October 11. History of having been sick for ten weeks. Bloody stools for five days previous to operation. Severe pain and tenderness over abdomen, general diarrhea during entire ten weeks, passage once every hour since entrance to hospital, some pain during micturition. Temperature 101°, pulse 104, respiration 25. October 13, 25 stools in twenty-four hours. October 16, lumbar myositis most painful in right side. October 20, great tenderness with tumefaction and tympanites. October 23, Dr. Murphy saw patient and decided to make an exploratory laparotomy. Usual incision, about half a pint of very offensive fæcal pus as well as fragments of necrotic tissue (3 inches long) escaped. The cavity had the appearance of a large diphtheritic abscess. Iodoform gauze used as drainage. Condition gradually grew worse, and patient died at 2 p. m.

Post-mortem: Total destruction of mucous membrane of colon, in parts resembling, microscopically, the appearance of honeycombed tissue. Mucous membrane loosened as a tube from submucous tissue and gangrenous. The incision was made directly into cæcum, which had lost all resemblance of a mucous membrane. Appendix not affected in anyway.

Case 126.—Date of operation, November 1, 1893. Operator, Dr. Murphy. Mrs. J.; age, 44.

Case occurred in the practice of Dr. William E. Quine. Patient suffered from five attacks in the seven months preceding the operation, the last one, three weeks before the operation. It was more severe than the former attacks; began with sudden pain in right iliac region, and gradually extended all over abdomen. It was shortly followed by nausea and vomiting. Temperature reached 103°. There was increased sensitiveness as well as induration in right iliac region, general tympanites shortly followed. After five days the symptoms began to subside and disappeared entirely. The operation was performed after all the inflammatory symptoms had subsided.

Operation: Lateral incision. Appendix found firmly adherent to side of cæcum, distal end distended and somewhat œdematous. Proximal end close to cæcum very much contracted. Ligature applied at seat of contraction. Packed with iodoform gauze. Time of operation, six minutes. Gauze removed in forty-eight hours and

sutures tied. Convalescence uneventful. Examination of appendix showed complete occlusion at the neck. Cicatrices at side showing where it had ruptured into the cæcum. Repeated accumulation in the appendix without an outlet was evidently the cause of the recurrences.

Case 127.—Date of operation, November 2, 1892. Operator, Dr. Murphy. A. B.; male; age, 26. Alexian Brothers' Hospital. Case occurred in practice of Dr. Hoelscher.

History: Patient felt slightly indisposed Tuesday, October 30. November 1, severe pain in abdomen; exaggerated in right iliac region. Patient seen on that evening by Dr. Hoelscher; transferred to Alexian Brothers' Hospital at once. Temperature 101°. November 2, 9 a. m. Patient had considerable pain during the night; is very sensitive over the appendix. No induration. Temperature, 100°.

Operation: November 2, 1893, 10 a. m. Lateral incision. Appendix reached without difficulty, very much distended, gangrenous on one side, had not ruptured, no infection of the peritoneum. Appendix drawn out, the wound packed with iodoform gauze, ligated, amputated, top-sewed, sutures inserted, iodoform gauze drain. Removed in twenty-four hours, sutures tied. Time for operation, ten minutes. Patient made a rapid recovery. Highest temperature after operation, 100 4°.

Case 128.—Date of operation, November 4, 1893. Operator, Dr. Murphy. D. T.; age, 44; male.

Attack began evening of October 26, with intense pain in the abdomen, which continued for several hours; it was accompanied by nausea and vomiting. October 27, pain less severe, tympanitic, sensitive all over abdomen, most marked in right iliac region, very slight induration, pulse 90°. Temperature 103°. Patient had a severe purulent bronchitis accompanying the attack. The symptoms continued until November 3, when he had a chill, followed by a temperature of 104°. Following morning, laparotomy.

Operation: Lateral incision, circumscribed abscess retro-cæcal. Packed around with iodoform gauze before opening. Appendix not removed. Following morning pulmonary symptoms more severe, bowels moved, temperature subsided to 101°. Pulmonary symptoms continued increasing. He died on the 5th day. Post-mortem not allowed.

Case 129.—Date of operation, November 5, 1893. Operator, Dr. Murphy. Miss N. R.; age, 17 years.

Case occurred in practice of Dr. Rose.

History: October 22, 6 a. m., patient's illness commenced with a gnawing in the stomach. Dressed with difficulty on account of soreness; not localized, as far as she noticed. October 23 and 24, pain was accompanied with nausea and vomiting. Enema of hot water was given, which relieved the symptoms. Induration felt. Patient did not manifest any serious symptoms for following two weeks. Very slight elevation of temperature with slight digestive disturbances. Induration remained. Mother gives history of diarrhœa, with slight hemorrhage. November 5, case was seen by Dr. Murphy. Operation advised.

Operation: Lateral incision. General peritoneal cavity not opened. Appendix not removed. circumscribed abscess. A large quantity of pus. Drainage. Recovery.

Case 130.—Date of operation, November 10, 1893. Operator, Dr. Murphy. W. M.; age, 12 years; male.

Case occurred in practice of Dr. Hayes. On November 3 patient was suddenly attacked with pain in the right side. On November 4, nausea, vomiting, increase of pain which patient described as cramps. As the symptoms had not subsided on the 5th of November (next day), a physician was called in.

Examination on November 5. Temperature 195°; pulse 120. Tympanites; abdominal tenderness general, but most marked in right iliac region. An opiate was administered, which relieved pain. November 6, pain more marked, but less intense; discontinuation of opiates resulted in return of pain. An operation was advised, but was not consented to. The symptoms continued up to November 10, when an operation was now agreed upon. Temperature at time of operation, 99°; pulse 90.

Operation: Lateral incision, general peritoneal cavity opened; a general suppurative peritonitis present. The bowels were covered with flakes of pus. Appendix not removed. Drainage. Recovery.

Case 131.—Date of operation, November 23, 1893. La Pla.; 16 years; male. Operator, Dr. Witter.

Case occurred in practice of Dr. Bergeron. Family history good. Ten days before operation patient complained of pains around umbilicus; later, localized in right iliac region. No vomiting. Tympanites appeared after a few days. Pain was more severe last two days before operation, when limbs were constantly flexed. Last three days frequent urination; complete loss of appetite.

Status presens; pinched features, limbs flexed; a very tympanitic abdomen, very sensitive to pressure. Induration in right iliac region, not well defined on account of tympanites. Not much pain at time of operation unless abdomen was touched.

Operation: Usual incision in right iliac region. Upon entering the peritoneal cavity the intestines were found agglutinated to the anterior abdominal wall. Upon severing the recent adhesions a large quantity of thin purulent, very offensive, pus escaped. Intestines found covered with large flakes of lymph. Two fingers were used in separating all the adhesions that could be reached, and finally a large abscess was reached which was in contact with the bladder, which had not been perforated. A glass drain was introduced into abscess cavity near bladder. Four days later a smaller one took its place. Gauze drain also used. Appendix not removed. No enterolith found.

Ten or twelve days after operation boy commenced to vomit, and complained of pain in left iliac region. His bowels had not moved for four or five days, and all symptoms of a second abscess to the left of the urinary bladder were present. With the intention of making a secondary operation, patient was again visited, but found by pressure from the outside and insertion of another glass drain the abscess could be drained without another incision. Boy had no further trouble. January 24, 1889, boy is up and around and is feeling perfectly well.

Case 132.—Date of operation, November 25, 1893. Operator, Dr. Murphy. Chas. B.; age, 40; male.

Case occurred in practice of Dr. Rohr. Patient gives a history, which leads to suspicion that he had previous attacks of appendicitis. Present attack began forty-eight hours before operation, with sudden pain in abdomen, nausea, vomiting, and moderate rise in temperature (about 101°). On second day extreme tympanites developed; the pain had increased. No induration to be felt.

Operation: Appendicisectomy. The general peritoneal cavity was opened and a general suppurative peritonitis found to be present, without adhesions. Pus covered the bowels to a great extent. The appendix was located, brought into the abdominal incision, ligated and amputated. The abdominal cavity drained with iodoform gauze. The temperature at no time was over 101°; the pulse was very rapid (140) at time of operation.

The appendix was gangrenous, not perforated, contained no foreign body. Patient had persistent vomiting for three days after operation, which then subsided. He then made an uneventful recovery. This is another illustration of extensive purulent infection of the peritoneal cavity forty-eight hours after the onset of symptoms, in which there was no perforation, but a gangrene of the wall. The bowels were eroded somewhat of their endothelium, but not sufficiently to admit of the fatal sapræmia.

Case 133.—Date of operation, November 28, 1893. T. S.; age, 32. Alexian Brothers' Hospital. Operator, Dr. Murphy. Occurred in practice of Dr. Rohr. Patient says he has had two similar attacks previous.

History: Present illness began November 26, with colicky pains, after a dose of oleum ricini to move bowels. November 27, 10 p. m., pains had continued accompanied by nausea and vomiting, and did not cease until November 28, 3 a. m. Pain localized in right iliac fossa.

Examination: Tenderness and induration in right iliac fossa, on pressure. Temperature 104° before operation.

Operation November 28, 2 p. m. Usual incision; no circumscribed abscess. Appendix almost entirely covered with omental adhesions. Had not perforated, however. Pus oozed out through punctures made by forceps used for holding it up for ligation. Appendicisectomy. Appendix found to contain about one-half dram of pus. Its tissue was gangrenous. Appendix three inches long, size and thickness of little finger. Flakes of pus visible in opening peritoneal cavity. Time for entire operation seven minutes. Temperature fell to normal after operation and patient made an uneventful recovery.

Case 134.—Date of operation December 19, 1893. M. W.; age, 28; male. Operator Dr. Murphy. Case occurred in practice of Dr. Berry.

History: December 16, complained of being tired and feverish. December 17, slight soreness in right iliac region. December 18, tenderness over entire abdomen. Temperature 100°, pulse 80. December 19, temperature 101°; pulse 85 before operation.

Operation: Lateral incision, intra-peritoneal. Retro-cæcal. Abscess around appendix. Flakes of pus on bowels outside of abscess. Peritoneum protected with iodoform gauze. Abscess opened, sponged. Appendix adherent to posterior parietal wall; easily elevated and amputated. Drainage with iodoform gauze. Recovery.

Pathological conditions: Circumscribed abscess. Appendix perforated. Flakes of pus on bowel outside of abscess.

Case 135.—Date of operation, December 20, 1893. Operator, Dr. Murphy. E.; age, 26; female. History: December 7, typical attack. Pain at first general, later local. No tympanites. Temperature 100 to 103 in first forty-eight hours. First constipated, then had an attack of diarrhœa. Marked induration over appendix.

Operation: Lateral incision; protection of peritoneal cavity with iodoform gauze, and drainage of an intra-peritoneal abscess. Glass drain and iodoform gauze used.

Temperature remained at 100.5° for ten days after operation, then ran up to 103°, and remained so for forty-eight hours. Temperature again normal on twentieth day. Recovery.

Pathological conditions: Intra-peritoneal abscess extending down into the pelvis. About six ounces of very thick, creamy pus escaped; in it was the appendix, which was entirely gangrenous and perforated at its base.

Case 136.—Date of operation, December 22, 1893. Operator, Dr. Murphy. Case occurred in practice of Dr. Hoelscher. O. T.; age, 20; male.

On November 22 patient was attacked with sudden, severe, colicky pains in abdomen; it caused an indisposition for a couple of days. He was then able to be out again. These attacks occurred occasionally for the following twenty-six days. At no time was he well, though able to be about. On December 18 the pain became extremely severe; was located in the right iliac region, and was shortly followed by nausea and vomiting. It increased in intensity; the temperature rose to 101. This condition continued up to the time of operation, four days later.

Examination: Abdomen tympanitic, uniformly distended, no induration, excessively tender in right iliac region.

Operation: Lateral incision; general peritoneal cavity opened. An abscess of considerable size was seen situated around the head of the colon and in the retro-cæcal fossa. General peritoneal cavity protected with iodoform gauze packing; abscess opened. About 8 ounces of pus escaped, and in it the gangrenous appendix. Glass drain. Recovery.

Pathological conditions: Appendix completely gangrenous and separated from its attachment at the base. All of its coats were macerated except the peritoneal, which could be filled with water and resembled the rubber of a toy balloon. Two fecal stones.

Case 137.—Date of operation, December 29, 1893; Operator, Dr. Murphy. Mrs. G.; age, 24.

When performing laparotomy for tubal disease, the appendix was found very much elongated, congested, swollen, and adherent to side of uterus and proximal end of right tube, causing traction upon cæcum, and undoubtedly accounted for some of the symptoms from which she was complaining. Result, recovery.

Case 138.—L. J.; age, 21; male. Date of operation, December 31, 1893. Case occurred in the practice of Dr. Weatherly. Operator, Dr. Murphy.

History: Patient was seized with a chill December 29: severe pain when walking; this pain lasted through the night and was accompanied by vomiting and fever. Dr. Weatherly saw the case December 30 at 8 p. m. Patient was sent to hospital. December 31 at p. m. temperature 101°, pulse, 83.

Operation: Appendix found partially adherent to liver, two inches necrotic, but not perforated; not covered by omentum; no foreign body. When appendix was elevated pus oozed through the pores in its wall, showing that perforation was about to take place. The mucous membrane has entirely disappeared, and was commingled with the fluid débris. No pus outside of appendix. Twenty-four hours drainage; recovery.

Case 139.—Date of operation, January 4, 1894. Operator, Dr. Murphy. C. H. M.; age, 25; male. Case occurred in the practice of Dr. George Barnett, Ishpeming, Mich. Recurrent appendicitis. First attack May 30, 1891; sick for five days; second attack September 23, 1892; sick for ten days; third attack December 24, 1893, began with sudden severe pain in the abdomen, followed by vomiting, great tenderness; temperature 103°. After two days, temperature dropped to 99.5° and remained so till December 31, when it suddenly rose to 104.2°, with pulse 120. Marked tumor was present in right inguinal region at that time. Operation was urged by the doctor and consented to.

Examination: No tympanites; no general abdominal tenderness; a distinct tumor in right iliac region which appeared to come close to the skin. Temperature 100°.

Operation: Lateral incision into an abscess which had already penetrated the walls of the abdomen and invaded the subcutaneous cellular tissue. This opening was enlarged with the finger and the abscess cavity within the abdomen examined; no fecal stone; appendix could not be located; drainage; recovery.

Case 140.—Date of operation, January 6, 1894. Operator, Dr. Murphy. Case occurred in the practice of Dr. Riese. L. B. C.; age, 35 years; male; Detroit, Mich.

Patient was attacked with severe pain in the right side of abdomen, followed by nausea and severe vomiting. Temperature on morning of operation 101°; no induration; no tympanites. A very sensitive point could be felt in the right iliac region; the appendix could be outlined.

Operation: Lateral incision; appendicisectomy; gauze drainage; sutures inserted but not tied. The appendix was not adherent; appeared normal on its peritoneal surface, although very hard to touch. Mucous membrane inflamed, swollen, gangrenous in spots; contained a number of seeds. Gauze drain removed in twenty-four hours; sutures tied; recovery.

Case 141.—Date of operation, January 15, 1893. Operator, Dr. Murphy. C. G.; age, 30; male; Alexian Brothers' Hospital.

Present illness began fifteen days before operation with pain in abdomen, accompanied by fever and sweats. The pain gradually centralized in the right iliac region. Was able to be up and about and came to office day of operation.

Examination: No tympanites; induration and tenderness in ileo-cæcal region extending down to pubis. Nothing to be felt from the rectum.

Operation: Lateral incision; general peritoneal cavity opened. Tip of appendix firmly adherent over iliac vessels; liberated with difficulty; body free; removed; sutures inserted but not tied; iodoform gauze drain. The distal half inch of a very elongated appendix (4 inches) was swollen to three times the size of the remaining portion. Minute gangrenous spots on mucous surface; no perforation Gauze drain removed in twenty-four hours and sutures tied; recovery.

Case 142.—Date of operation, January 30, 1894. Operator, Dr. Wittwer. Male; L.; age, 30.

History: Three days previous to operation patient was suddenly attacked with pain in right iliac region; this was followed within an hour by vomiting; temperature 102°. The following day the abdomen was tympanitic and very tender on right side. On morning of the third day patient had a severe chill. Temperature at time of operation 100.5°.

Operation: Lateral incision over induration, which was now more marked under thea næsthetic. General peritoneal cavity opened; flakes of pus over cæcum and omentum; appendix adherent, necrotic; small circumscribed abcess at base; thin sero purulent fluid; adhesions liberated; appendix ligated; iodoform gauze drain; recovery.

Pathological conditions: Appendix perforated in one spot, and showed two other gangrenous places ready to perforate.

Case 143.—Date of operation, February 6, 1894. Operator, Dr. Murphy. Female; Juliet M.; age, 19. Case occurred in practice of Dr. Berry.

History: Primary attack. Present illness commenced three and a half days prior to operation with intense pain in right iliac region, which rapidly spread over entire abdomen. Nausea and vomiting followed within an hour. All these symptoms and tympanites were present on second day. Vesical tenesmus severe.

Examination: Time of operation temperature 102°, pulse 120. Very anxious expression, mental exhilaration, great thirst, gulping, extreme tympanites; a complete absence of peristalsis; not a sound could be heard in any portion of the abdomen for fully ten minutes. No dullness either on light or dull percussion.

Operation: Lateral incision; general peritoneal cavity opened; at once a small quantity of sero-purulent fluid escaped which was very offensive. There were no limiting adhesions. Every separation of the coils of intestine was followed by an additional discharge. Douglas's pouch full of pus. Appendix adherent to fundus of bladder; liberated and removed without rupturing. Iodoform gauze and glass drainage. Intestines denuded of their endothelium, resembling a blistered surface. Symtoms of sapræmia continued, and patient died twenty-two hours after operation. General suppurative peritonitis.

Pathological conditions: Appendix enlarged size of thumb; gangrenous, full of pus; enterolith size of grape seed; no perforation, still general suppurative peritonitis.

Case 144.—Date of operation, February 9, 1894. Operator, Dr. Murphy.

Occurred in practice of Dr. J. M. Auld, who made a diagnosis and ordered operation three hours after the onset of attack, for which he deserves the congratulations of the profession and the patient. A. W.; age, 19; male.

Patient first attacked a year ago and had a similiar attack three and one-half months before present one. He was operated upon at the time of the second attack; a circumscribed abscess was drained; the appendix was not removed. The present attack began the day before the operation with sudden pain, followed by nausea and vomiting. The patient was brought to the Cook County Hospital on the first day of sickness and early the next morning he was operated upon, eighteen hours after onset. Temperature at time of operation 99°, pulse 100. Slight tympanites; no induration to be felt.

Operation: Lateral incision an inch towards the median line from the old scar. General peritoneal cavity opened; sero-purulent fluid situated around the head of the colon; peritoneum congested but not abraided. The appendix was situated across the iliac vessels, adherent behind; half of it hung over the brim of the pelvis. The appendix and cæcum were elevated out of the wound. About three drams of sero-purulent fluid was sponged out. There were no limiting adhesions around the pus. The seat of penetration of infection could be easily recognized on the peritoneal surface of the appendix. Appendix ligated; amputated; gauze drain; recovery.

Pathological conditions: The proximal two-thirds of the mucous membrane of appendix greatly swollen. A small ulcer existed where the infection penetrated the

wall, but there was no perforation. What would have been the result in this case under expectant treatment?

Case 145.—Date of operation, February 12, 1894. Operators, Drs. Murphy and Verity. Mrs. E. P.; age, 42.

Patient had first attack in July, 1893; had a second attack January 14, 1894, which commenced with severe pain just below the margin of the last rib. This was accompanied by nausea, but no vomiting. For the first few days there was no fever; temperature not taken. This subsided, but the pain and tenderness continued until the time of operation. Patient had never been jaundiced.

Examination: With anæsthetic. An induration, extending from the margin of the ninth costal cartilage downward 3 inches, could be felt distinctly. It was stationary during the respiratory act. It could not be separated from the abdominal wall, nor could it be displaced to the left. It could not be separated from the kidney, nor could the kidney be outlined.

Operation: Temperature at time of operation normal. Incision over induration. Peritoneal cavity opened; colon was found adherent to lateral wall of the abdomen just below the margin of the ribs; the adhesions were separated and the remains of an abscess detected; no pus; the cæcum was found adherent and folded upon the posterior surface of the ascending colon. The appendix was found perforated at its tip communicating with the abscess. It could be seen where the abscess had emptied into the posterior wall of the colon at its hepatic flexure. Appendix ligated; amputated; recovery.

Remarks: This is the first time I have found the cæcum folded on to the posterior surface of the colon. The abscess was situated just below the edge of the liver.

TRATAMIENTO DE LOS ESTRECHAMIENTOS MÚLTIPLES BLENORRÁJICOS DE LA URETRA POR LA URETROTOMÍA DOBLE CON CANALIZACIÓN VÉSICO-URETRAL.

Por el Dr. JUAN MARTINEZ DEL CAMPO, de México.

SEÑORES: Asunto de la mayor importancia es el enunciado, como se comprende muy facilmente, por ser una de las cuestiones que diariamente se presentan en la práctica quirúrjica y que á pesar de esa frecuencia, ha sido de las más difíciles de llevar á buen resultado. En efecto, todos los procedimientos para tratar los estrechamientos uretrales han adolecido siempre del defecto capital de exponer tarde ó temprano á la reproducción del accidente, y no puede ser de otro modo, pues si se reflexiona sobre el modo de obrar de los instrumentos inventados para seccionar la coartación uretral y el papel importantísimo y constante que desempeña el órgano encargado de expulsar á todas horas el líquido de excreción más esencial de la economía, se comprende que estas solas circunstancias bastan para hacer difícil, y sobre todo permanente, su vuelta al estado normal.

La uretra es un canal virtual que tiene aplicadas sus paredes cuando está en reposo, separándose estas solamente en el momento de dar paso á la orina. Si un instrumento, por muy perfeccionado que se le suponga, divide solamente los tejidos que constituyen la estrechez sin destruirlos, estos al aplicarse de nuevo se ponen en condiciones de cicatrizar, y si por otra parte la función esencial de todo el aparato génito-urinario, la emisión de la orina, sigue haciéndose por ese canal alterado en el que la barrera opuesta al curso de la orina no permite que esta salga completamente hacia afuera sino que una parte por pequeña que sea se quede en la dilatación que hay siempre detras de todo punto estrecho y en el bajo fondo de la vejiga irritando más y más la delicada mucosa que la forra interiormente, y alterando constantemente su estructura, salta á la vista la dificultad que hay para devolver á ese canal su calibre normal.

Hemos supuesto hasta aquí el caso de una sola estrechez y tratada solamente por la uretrotomía interna. Piénsese en el más frecuente, de varias, y fácilmente se comprenderá la mayor dificultad para su curación.

Pero aún suponiendo que no se siga este procedimiento sino el más racional, es decir, la uretrotomía externa, que divide directamente las estrecheces en todo su espesor y deja separados los bordes de la herida hecha con el bisturí, á diferencia del de Maisonneuve, por ejemplo, que como hemos dicho permite la aproximación de esos mismos bordes; si no se procura que los tejidos de nueva formación que constituyen la estrechez, se destruyan de algun modo, esta se reproducirá necesariamente por cuanto á que aquellos permanecen formados de sus mismos elementos y sin cambio ninguno en su estructura.

Esto es tocante á la uretrotomía interna ó externa: en cuanto á la dilatación gradual, es más difícil comprender que sea el procedimiento para curar la afección de que se trata. Separándose tan solo las paredes del canal y los puntos coartados durante un tiempo más o menos largo, los tejidos por su misma elasticidad vuelven sobre sí, dejando intactos los que constituyen la coartación.

Hace más de diez años que he visto seguir á mi maestro, el Profesor Lavista, un procedimiento más racional para curar esta clase de estrechamientos. Ha dado siempre tan buenos resultados, que no solo los innumerables casos del mencionado profesor, sino los que me pertenecen tratados del mismo modo, me animan á presentar esta pequeña memoria, en la que no haré más que describir el procedimiento operatorio y los buenos resultados que él ha dado, apoyado en multitud de observaciones que hemos tenido la buena fortuna de comprobar despues de mucho tiempo de la intervención.

Hay en dichas observaciones algunas tan importantes, que me permitiré detallar brevemente aunque sea una, pues sirve de fundamento al modo de obrar que voy á señalar.

Antes tengo que repetir que no se trata de estrechamiento único, flojo y reciente de la uretra, en el que el procedimiento de dilatación gradual y progresiva, ó la sección y divulsión por el de Otis, pueden dar y dan á veces buen resultado, nó, yo me ocupo de las estrecheces anulares, múltiples, con cambio completo en la estructura del canal y muy frecuentemente acompañadas de blenorrea; que á veces son tan estrechas que se hacen casi infranqueables, en otras se ha alterado de tal modo la uretra, que se hace verdaderamente fungosa, sangrando al menor contacto; algunas en que siendo casi imposible la desocupación de la vejiga por el obstáculo mecánico que se le opone, se hace infiltración de la orina en distintos puntos, dando lugar á fístulas que hacen del perineo y de la región escrotal una regadera que atormenta al enfermo y le hace buscar un alivio pronto á sufrimientos tan grandes; otras veces, por fin, en que debido tal vez á resistencia especial de los tejidos, que no permite su perforación, al acumularse más y más la orina en su receptáculo, hay verdadera retención de ella con los gravísimos desórdenes que provoca y que es urgente remediar en el acto, porque de lo contrario se compromete de un modo inmediato la vida del enfermo.

Muchos muchísimos de estos casos, que presentan un cuadro tan alarmante, he tenido ocasión de observar, operados con la habilidad que caracteriza al Profesor Lavista, y que han sido salvados de una muerte segura y han recobrado la integridad de su aparato génito-urinario.

Voy pues, á describir el manual operatorio á que he hecho referencia.

Prévia la anestesia clorofórmica, y despues de haber rasurado y desinfectado el perineo, se procede á la desinfección de la uretra por medio del tubo de Lavaux, y si es posible, á la de la vejiga por medio de una sonda y solución de ácido bórico caliente al 4 por ciento. En seguida se practica la uretrotomía interna siguiendo el procedimiento de Otis, y una vez terminada esta, se coloca un cateter en la vejiga y se procede á hacer el ojal perineal, siguiendo en todo las reglas especiales para estas operaciones; se lava perfectamente la herida, la vejiga y la uretra, se hace la hemostasia correspondiente y se coloca una sonda de Nélaton, ordinariamente del número veintiocho que entra por el ojal hasta la vejiga.

A dicha sonda se le han practicado préviamente dos ó tres agujeros á más del

natural, con objeto de que no se tape con los coagulos á que dá lugar la necesaria exhalación sanguinea. Se coloca otra sonda del mismo autor número veintidos ó veintitres, en la parte anterior de la uretra, la que entrando por el meato se hace salir por la parte anterior del ojal perineal. Dicha sonda se fija, poniendo un alfiler de seguridad en la parte anterior, á dos ó tres centímetros adelante del meato y otro á igual distancia de la herida perineal. La sonda que vá á la vejiga, se asegura por medio de otro alfiler perpendicular á la herida y en los extremos del cual se hacen pasar unas cintas que cruzándose, se ván á fijar en el vientre del enfermo, acolchonando con algodón ó lienzos ad hoc, los lugares en donde alguna saliente huesosa pudiera molestar al paciente.

Se coloca entre la herida y el alfiler que sujeta el tubo que vá á la vejiga un apósito consistente de ordinario en algodon ó gaza yodoformada, que mantiene desinfectada la herida y evita que moleste el asegurador; y se completa este aparato añadiendo al sifón vesical un tubo largo y lleno que vá á terminar en un orinal que está colocado abajo de la cama y al que se ha puesto una solución desinfectante en donde sumerje la extremidad libre de dicho tubo.

La marcha consecutiva, en lo general, es enteramente feliz: el enfermo entra en descanso, pues con excepción de las primeras veinticuatro ó cuarenta y ocha horas, en que la presencia del tubo vesical le provoca la sensación de un tenesmo incómodo, que desaparece en el mayor número de casos, trascurrido ese tiempo, siente como hemos dicho, un bienestar muy grande.

La orina escurre gota á gota constantemente por ese tubo y por consiguiente tanto la vejiga como el canal uretral entran en reposo. Se puede lavar y desinfectar constantemente el receptáculo urinario y la uretra anterior y profunda, quitando las sondas para colocarlas de nuevo despues de haberlas desinfectado.

En el caso muy frecuente de alteración de la mucosa vesical, se cura directamente esta con las sustancias á propósito y sin dificultad alguna.

La permanencia de la sonda provoca una uretritis aguda que termina por supuración desde el tercero ó cuarto dia y esto, que á primera vista pudiera parecer un inconveniente serio, es precisamente la ventaja del procedimiento puesto que el trabajo supurativo funde los tejidos que constituyen la estrechez.

Una vez que aparece este accidente, se retira la sonda que está colocada en la uretra anterior y se tiene perfectamente aseado todo el canal lavándolo cuantas veces sea necesario con solución bórica al cuatro por ciento ó anilina violada á uno por cuatro mil. Se cuida de pasar diariamente la sonda para conservar la integridad del canal pero sin dejarla yá á permanencia.

Cuando ha terminado el trabajo de supuración que comunmente dura quince dias y que la vejiga ha recobrado sus condiciones normales, se quita la sonda vesical primitiva que, como hemos dicho, es del número veintiocho sustituyéndola por una más delgada, número veintiseis, la que se conversa dos dias para dar tiempo á que avance un poco la cicatrización; despues esta, se cambia por otra del número veinticuatro, conservándola otros dos dias y así sucesivamente hasta llegar al número diez y ocho ó diez y seis, en cúyo momento se quita yá definitivamente, dejando que la orina salga sin sonda. En el mayor número de los casos sucede lo siguiente: La primera emisión de orina que se verifica sin sonda se hace totalmente por el ojal; en las siguientes se divide este liquido, una parte, la más considerable, sale aún por la herida y la otra, la más pequeña, por el meato y así lenta y gradualmente vá aumentando la que escurre por este último punto y disminuyendo la que sale por el primero, hasta que trascurridos tres ó cuatro dias, sale esta completamente por el canal natural, lo que indica que la cicatrización de la uretra ha terminado yá. La de los tejidos blandos del perineo se verifica en seis ú ocho dias más, tardando en total unos veinticinco ó treinta dias desde el momento de verificada la operación.

La descripción anterior se refiere al mayor número de los casos, ofreciendo en muchos una multitud de variantes tanto en la marcha como en la duración.

Algunas veces se presentan accidentes que reclaman indicaciones especiales y que

obligan á alterar el programa general: el tenesmo que provoca la presencia del cuerpo extraño colocado dentro de la vejiga es en ciertos casos tan fuerte, que obliga á quitar aquel antes del tiempo necesario para la curación de la vejiga y la fusión de las estrecheces; la hemorragia, rara por cierto en mis observaciones, se ha presentado sinembargo, obligando á quitar todo el aparato, á poner la sonda de camisa de Dupuytren y á hacer el taponamiento consiguiente, para volver á colocar aquel una vez correjido el accidente; la orco-epididimitis consecutiva á la uretritis aguda supurada, complica á veces la operación, ocasionando como es natural grandes molestias al enfermo y obligando á llenar las indicaciones que ella reclama; puede presentarse tambien la fiebre de absorción urinosa con su alarmante cortejo de síntomas; pero en el mayor número de casos se combate facilmente con los medios apropiados.

Repito que no hago más que relatar el producto de las observaciones seguidas de diez años á la fecha, con los resultados inmediatos y lejanos de la intervención señalada. Los primeros no pueden ser más satisfactorios: el enfermo tratado de este modo siente desde luego un bienestar inmenso, atormentado antes por las grandes molestias que ocasiona esa afección y expuesto al peligro inminente de perder la vida con horribles sufrimientos, siente desde luego el beneficio de la evacuación completa de su vejiga y la reintegración de su importantísimo aparato génito-urinario, asegurando la existencia comprometida antes de un modo tan serio.

Los resultados lejanos de este modo de obrar son tambien muy halagadores, y esto es verdaderamente lo que me ha decidido á escribir estas mal forjadas líneas. Con efecto, hemos tenido la buena fortuna de ver á muchos de los enfermos tratados en el trascurso de estos diez años, y el cuidado de rectificar las condiciones de su canal, el cual se ha conservado en un estado muy satisfactorio. De otros, aún cuando no los hemos visto, sabemos que se conservan en buenas condiciones sin haber tenido necesidad de nueva operación.

Asciende á ochocientos el número de enfermos tratados de este modo en el trascurso de tiempo señalado, pues tanto en el Hospital de San Andrés, como en la casa de salud particular del Dr. Lavista y en su clientela civil es un asunto muy frecuente. Pues bien, de este número de observaciones, lo menos una cuarta parte corresponde á los enfermos examinados despues de cuatro, seis, ocho ó diez años de operados, sin que, como hemos dicho, hayan tenido necesidad de nueva intervención. Ultimamente hemos visto uno de estos, operado el año de 1886, cuya historia paso á relatar en compendio, porque ofreció condiciones muy especiales:

A. V., de 58 años, casado, comerciante, refiere haber sufrido hace más de treinta años varias blenorrágias, comenzando á padecer de estrechamientos de su canal algun tiempo despues. Estos fueron aumentando lenta y gradualmente hasta hacerle casi imposible la emisión de la orina: tuvo retenciones agudas que obligaron á sondearlo y á puncionar su vejiga Se le practicó también la uretrotomía interna consiguiendo alivio algunos meses, pasados los cuales, valvió á su anterior situación. Al solicitar los cuidados del Profesor Lavista tenía este enfermo varias fístulas por donde salía la orina totalmente.

La operación fué muy laboriosa por cuanto á que la uretra formaba un cordon duro inaccesible enteramente al paso de cualquier instrumento. Hubo necesidad de practicarle la uretrotomía externa sin conductor y canalizar la vejiga. Despues con paciencia se fué colocando el conductor del uretrotomo de Maisoneuve dividiendo la porción del canal que se conseguía franquear y avanzando muy poco á poco con él hasta que se logró, despues de muchos dias, llegar á la parte anterior del ojal, es decir, hasta que pareció haberse franqueado toda la uretra anterior.

Una vez hecho esto, se canalizó con sonda de Nélaton número veintidos; todos los dias se quitaban los tubos para desinfectarlos, así como el nuevo canal, y un dia al hacerle la curación no se pudo colocar la sonda anterior, lo que obligo á introducir el dedo meñique en la herida perineal y esta exploración enseñó que una porción de la uretra, como de dos y medio centímetros de extensión, no habia sido seccionada, sino que la continuidad de aquel canal se habia restablecido á expensas de los demas tejidos blandos. Entonces se prolongó hacia adelante el ojal, haciendo una disección cuidadosa hasta alcanzar la parte de la uretra que habia sido respetada antes. Dividida esta, se hizo pasar la sonda desde el meato por este lugar y se fijó como de costumbre, restableciéndose así la continuidad del canal.

Aquella sonda permaneció colocada cuarenta y cinco dias sin dar lugar más que á la supuración abundante del canal, el cual se desinfectaba constantemente sin quitar

el tubo sino cada cuatro ó cinco dias, para lo cual se perforó este de bastantes agujeros colocados á dos ó tres centímetros de distancia uno del otro y correspondiendo á sus paredes anterior, posterior y laterales. Dicho agujeros se habian hecho previamente con el termo-cauterio de Paquelin para que quedaran perfectamente regulares. Todos los dias se movia la sonda mencionada al hacer el lavado, para que todos los puntos de aquella uretra tan alterada, se pusieran en contacto con el agua del lavado.

De este modo se consiguió que aquel canal que estaba totalmente obturado, y que aquellos tejidos que habian adquirido una consistencia casi calcarea, se hiciera permeable al paso de la orina fundiéndose los tejidos que constituian aquella multitud de estrecheces, que ya no formaban sino una sola, en una extensión de canal muy considerable.

Este enfermo obedeciendo á la indicación que se le hizo, se sondea de cuando en cuando, conservando hasta la actualidad un canal bastante para desempeñar sin molestia sus funciones naturales.

Dos ó tres casos más, análogos al anterior se registran en nuestras observaciones con el mismo buen resultado inmediato y tardío, y otros muchísimos que sin haber llegado á ese grado tan avanzado de estrechamiento de su canal, hasta hacerlo como se ha visto, casi impermeable al paso de la orina, presentaban sinembargo alteraciones de la uretra y consecutivamente de la vejiga.

La inmensa mayoría han obtenido el beneficio de la curación de su blenorrea que, como es bien sabido, es rebelde á todos los tratamientos hasta hoy aconsejados para curarla. Una de las sustancias que en nuestras observaciones parece haber contribuido á este buen resultado, es la anilina violada, que se ha usado amplísimamente en solución á uno por cuatro mil para hacer el lavado de la uretra y de la vejiga. Con ella hemos visto modificarse la secreción muco-purulenta y agotarse muchas veces los escurrimientos crrónicos de la uretra.

Termino ya pidiéndoos vuestra indulgencia para esta incorrecta memoria, dándoos las gracias por vuestra benévola atención y deduciendo de las anteriores reflexiones las conclusiones siguientes:

Primera. Los estrechamientos múltiples blenorrágicos de la uretra constituyen una afección muy frecuente y de una duración muy larga.

Segunda. Comprometen sériamente la integridad del aparato génito-urinario y consecutivamente la vida del enfermo.

Tercera. Los diversos medios aconsejados para su curación son paliativos pues exponen á la reproducción del accidente.

Cuarta. El procedimiento que parece dar mejores resultados es la uretrotomía doble con canalización vésico-uretral.

¿CUAL ES EL MEJOR TRATAMIENTO DE LOS ABSCESOS DEL HÍGADO?

Por el Dr. SALVADOR GARCÍA LUGO, México.

Chassaignac inventando sus trócares y el eminente clínico, Jimenez, sirviéndose de ellos para la punción y canalización de estos abscesos nos enseñaron un método verdaderamente quirúrgico para su tratamiento.

Los resultados prácticos no se hicieron esperar largo tiempo, y la observación clínica y los datos estadísticos demostraron palmariamente la superioridad de este método curativo respecto del preconizado por Récamier.

El Dr. Jimenez, de México, con la perspicacia de su talento clínico, se cercioró y pudo asegurarnos que la canalización ordinaria no permitía la introducción del aire á la cavidad del foco, en virtud de las disposiciones anatómicas que relacionan íntimamente al hígado con la cara inferior del diafragma y la interna del hipocondrio derecho.

Una vez probada, la excelencia del método y los felices resultados de su aplicación aparecieron procedimientos que lo mejoraron progresivamente.

El Dr. Clément propuso la canalización doble del absceso por medio de dos tubos colocados en distintos puntos de un espacio intercostal ó en diferentes espacios. Teóricamente era aceptable su indicación y solo faltaba la sanción de la práctica. Si podia objetarse que el sufrimiento sería mayor, siempre que no se usara la anestesia, la gran facilidad con que se practicaría el lavado del foco, y se daría curso al pus disponiendo de dos vias, contestaban la objeción.

Guérin recomendaba la curación serrada y la punción subcutanea para impedir la entrada del aire á las cavidades purulentas, cuando Dieulafoy proporcionó á la cirugía el recurso de la aspiración. Morton en Londres y Clément en Guadalajara cauterizaban las superficies sangrientas y las cavidades supurantes con soluciones concentradas de cloruro de zinc, para sustraerlas del contacto del aire, secundando las miras de Guérin, aunque con diverso procedimiento y á la vez utilizando los buenos efectos de la detersión. Potain mejoró la aspiración con la invención de su aparato y Lister dió á conocer los sorprendentos resultados de su curación.

En nuestro país so hacian esfuerzos en igual sentido: El Dr. Benitez comenzó en Guadalajara á cauterizar los focos hepáticos después de evacuada su colección con soluciones concentradas de iodo y ácido fénico obteniendo la cicatrización de las paredes del absceso con punciones hechas con el aspirador de Potain antes de canalizarlo; y cuando no alcanzaba tan felíz éxito la canalizaba; mas cerrando la extremidad libre del tubo de desagüe, y lavando las cavidades con dichas soluciones, procurando dejar en ellas una cantidad que sin extender demasiado sus paredes las modificaran ventajosamente. Después imaginó un aparato de aspiración neumática continua que puesto en comunicación con el foco por medio de un tubo elástico largo, ajustado al de canalización, aspira el pus á medida que se forma.

Es inútil ponderar las notorias ventajas de estos procedimientos porque son palpables y la experiencia ha fallado ya en pro de ellas.

La Escuela de Guadalajara se sentia satisfecha con estos adelantos, creyendo salvar á la mayor parte de las víctimas de mal tan grave y frecuente entre nosotros; mas se han presentado algunos casos en que á pesar de un tratamiento tan seguro como científico y de la mayor escrupulosidad en su aplicación, el término ha sido desgraciado.

En los casos de este género la observación clínica y las lecciones de las autopsias nos enseñan que siempre que existen focos múltiples en el hígado, colocados á distintas alturas y comunicando entre sí por trayectos largos y sinuosos fracazaran estos tratamientos, porque el pus contenido en los focos más distantes del sitio en que se encuentra el canalizado no puede ser aspirado, porque al hacerse el vacio en los trayectos oblicuos que establecen la comunicación entre ellos, la presión combinada del paquete intestinal y del aire que existe en los pulmones la cierra adosando sus paredes irregulares y anfractuosas, por carecer el tejido glandular de estroma resistente y además estar dilacerado al nivel de dichos trayectos y convertido en una masa pulposa, blanda y que cede facilmente á la presión. Mientras más fuerte sea la aspiración, la tendencia al vacio lejos de protejer la salida del pus, favorece la yustaposición de las paredes del trayecto; siendo estériles el empeño y habilidad del cirujano para obtener un lavado completo de todas las cavidades existentes en la viscera; y aconteciendo á menudo, que después de haber extraido cierta cantidad de pus, de haber inyectado soluciones antisépticas y haberlas aspirado sin mezcla de supuración ni de detritus, continuando el lavado y variando la posición del enfermo ó sin hacerlo, sustrae la jeringa aspiradora una nueva porción de pus hepático ó flegmonoso.

Por regla general los enfermos que presentan esta clase de abscesos terminan agotados ó por septicemia, siendo impotente el tratamiento descrito para salvarlos.

La doble canalización proporciona la inmensa ventaja de hacer circular las inyecciones en el interior de los focos con mayor facilidad, supuesto que son empujadas y que la fuerza empleada para verificarlo hace caminar los líquidos por los trayectos penetrando en ellos y separando necesariamente sus paredes, que son obligadas á

entreabrirse permitiendo el acceso de las soluciones antisépticas hasta las cavidades más distantes, y por lo mismo, haciendo posible su aseo más completo. Además, puede variarse la dirección de la corriente inyectando alternativamente por uno ú otro tubo, sobre todo, cuando alguno de ellos es obturado por los grumos y detritus que existen en los focos para arrastrarlos hacia fuera en lugar de aspirarlos, que no siempre es posible; echar mano de la aspiración permanente ó interrumpida cerrando el orificio libre de alguno de los tubos con un taponcito ó con una llave; servirse de la irrigación continua ó periódica, lavando los focos como se acostumbra hacer con las pleuras con líquidos antisépticos y variando la altura del recipiente para graduar la fuerza de impulso, etc., ventajas que en un concepto legitiman la superioridad de este método para el tratamiento de los abscesos hepáticos, y principalmente si estos son múltiples y ofrecen las condiciones anatómicas indicadas.

Cuando son abundantes los grumos y detritus en los abscesos y se aplica la aspiración permanente, suele obstruirse el tubo de desagüe con alguno de ellos, y hay necesidad de limpiarlos y desobstruirlos varias veces al dia si se quieren utilizar los buenos efectos de este método; lo cual obliga á maniobras repetidas que deben ser hechas siempre por manos hábiles.

La práctica recomendada en Paris de abrir ampliamente los abscesos del hígado, incindiendo un espacio intercostal y si fuere necesario resecando una porción de costilla para evacuar la colección purulenta, lavar la cavidad y curarla como absceso expuesto con la curación de Lister, debe impedir indudablemente el extancamiento del pus y evitar su descomposición; mas siendo un traumatismo mayor y careciendo yo de experiencia personal acerca de este método, y por otra parte, juzcando indispensable y de gran utilidad para la cirugía americana, que los sabios y distinguidos médicos, reunidos en esta Asamblea, emitan su opinión autorizada y competente supuesta la frecuencia de la hepatitis supurada en nuestro país, me permitiré someter á su deliberación la importante resolución de cual sea el mejor tratamiento de los abscesos hepáticos, sirviéndose señalar las reglas generales de su aplicación; y cual debe emplearse siempre que exista seguridad de que son sépticos y producidos por la migración del pus de las ulceraciones intestinales efectuada por el sistema porta.

Espero de la ilustración de los miembros de este Congreso la resolución de asunto tan vital y que entraña el renombre de nuestros eminentes cirujanos la gloria de nuestras escuelas, y sobre todo, la salvación de las víctimas de esta terrible y común enfermedad.

SONDAS Y BUJÍAS GUÍAS.

Por el Dr. ALBERTO CASTAÑO, Buenos Aires, Argentina.

Entre los instrumentos con que cuenta el médico para el tratamiento de las estrecheces uretrales, se nota en la mayor parte de ellos defectos y deficiencias que son en la práctica fundamentales; me refiero solamente al método de la dilatación gradual que es, puede decirse el tratamiento clásico.

Tratándose de las estrecheces en las cuales la luz de la uretra no dá paso sino á pequeñas gotas de orina, es donde se encuentran las más serias dificultades.

Entre los instrumentos de que podemos disponer, tenemos las bujías Béniqué Guyon que se encuentran tan generalizadas y son de las que voy á hablar con más detención por ser su uso tan comun en todas partes del mundo.

Un simple análisis bastará para hacer resaltar los inconvenientes que tienen.

Tenemos en primer lugar una bujía metálica articulada á una fina guia de goma por unas vueltas de tornillo.

La parte metálica de la bujía no guarda proporción con la guia; hay una diferen-

cia tan notable, que á la simple vista resalta, de manera que colocada la guia en una estrechez filiforme, que la clasificaremos con el número 1, articulamos la bujía cuyo número menor corresponde al número 12 de la escala Charrier, y forzando el instrumento pasamos la estrechez.

Tendremos pues una verdadera dirección, un desgarramiento de la mucosa uretral en el punto estrechado, y por consiguiente una dilatación brusca que no será sino el método antiguo, modificado por instrumentos más perfeccionados.

La guia que se articula á la bujía es, á mi modo de ver, el defecto principal y que por si solo basta para desechar de la práctica esta clase de instrumentos.

Cuatro son las vueltas de tornillo que hay quedar para su articulación, y que al menor descuido tanto del médico como del fabricante, hace que este t rnillo ceda y se desprenda la guia quedándose en la vejiga.

En tercer lugar. la parte metálica de la bujía es otro de sus defectos. El maestro Thomson, de reputación universal, al hacer la descripción de estos instrumentos, les llama la escuela mecánica y en su juicio crítico dice: Que el instrumento en la uretra, aún cuando no exista ninguna afección, es una causa de irritación más ó ménos considerable, proporcionada á la rigidez y al volumen del cuerpo extraño así como á la manera de proceder. En el estudio comparativo entre las sondas rígidas y flexibles establece una diferencia notable entre unas y otras y con esa esperiencia y persuación que solo es permitida á los hombres de ciencia que se han encanecido, en la lucha diaria y el trabajo constante con el enfermo, desecha de un modo absoluto el instrumento rigido y le dá gran superioridad al flexible y termina diciendo: "Adoptad el instrumento flexible, que los sucesos en la práctica serán bien compensados."

No me detengo en el análisis de las otras clases de bujías y sondas, porque no son como para dominar una estrechez al principio del tratamiento, pudiendo simplemente emplearse para continuar la curación una vez que la luz de la uretra lo permita.

He usado durante muchos años las bujías Béniqué Guyon, tanto en mi clínica del hospital como en la práctica civil, reconociéndoles todos los inconvenientes que dejo señaladas. Habia leido tanto en libros como en revistas varios casos en que las guias se habian que dado en la vejiga á médicos distinguidos, habiendo yo mismo observado varios casos de sucesos semejantes y he podido reunir quince historias de casos desgraciados.

Apesar de todo continuaba en mi práctica diaria empleándolas por no poder disponer de otras clases de instrumentos hasta que un dia se me quedó una guia operando á un distinguido jóven al que no fué posible extraérsela por todos los medios conocidos apesar de los distinguidos cirujanos que intervinieron; fué necesario practicar la talla.

Entonces me propuse hacer los instrumentos que presento á la consideración de ese honorable Congreso, que si no llenan por completo un vacio en el arsenal quirúrgico, están por lo ménos exentos de los graves inconvenientes que dejo señalados en todos los de su clase.

CONCLUSIÓN.

Las bujías, como las sondas, son flexibles; los primeros números son filiformes en sus tres cuartas partes, aumentando su diámetro insensiblemente á medida que se aleja de su punta; tienen cada una cuatro diámetros más ó ménos, de manera que al pasar la fina guia por una estrechez vá dilatando insensiblemente, obteniéndose por lo tanto con una sola bujía una dilatación que corresponde á cuatro números de Charnier.

La longitud es de 54 centímetros, igual á las de Béniqué Guyon articuladas.

La curación es rápida, no existiendo ningun peligro en su empleo.

La colección la componen 12 números. Adjunto á esta pequeña memoria dos colecciones de instrumentos, bujías y sondas, para que esa honorable corporación con su sano criterio dé el fallo que le corresponda.

REPORT OF FOUR CASES OF BRAIN SURGERY.

By ANDREW J. McCOSH, of New York,
Visiting Surgeon to Presbyterian Hospital, Professor of Surgery in the Polyclinic.

The localization of cerebral functions has, in recent years, become so accurate that it was naturally thought much progress would be at once made in the surgical treatment of epilepsy. This anticipation has, however, not been realized; indeed the treatment of this disease by operative measures is attended by results, as far as cure is concerned, but little better than those which were obtained a score or more of years ago. It must be confessed that the great advances made in cerebral localization have thrown but little light upon the nature and treatment of epilepsy. While it is true that certain cases of Jacksonian epilepsy have been permanently cured by operation, yet we must acknowledge that operations for the cure of true idiopathic epilepsy have been discouraging.

Experimentation on animals has thrown but little light upon this subject, and it is probable that most of our accurate knowledge must be derived from the observations of the pathologist and the surgeon. On this account it is important that all cases which are related directly or indirectly with this subject should be reported. At the time of their report, individual cases, which, while interesting, may not afford suggestions for the formation of general rules for diagnosis and treatment, will eventually, by comparison with similar cases, lead to inductions which will be of the greatest value.

Each one of the following cases contain some point of special interest:

Case 1. Extra-dural hemorrhage; convulsions; operation; recovery.—Male, age 18. On July 29, 1889, patient was found lying on the bottom of a trench in a semicomatose condition. He had been in good health up to the previous night when, it was supposed that while under the influence of liquor, he had fallen into the trench, which was 6 feet deep. The accident must have occurred after midnight, and he was brought to the Presbyterian Hospital at 8 a. m. On his admission he was very stupid, but could be aroused so that he gave his name but not his address. Temperature, 100; pulse, 76. The scalp was contused in the occipital region, but there was no sign of fracture or hæmatoma. The pupils were symmetrical, and there was no paralysis. For twenty-four hours the patient showed the general symptoms of cerebral irritation (laceration), lying on his side, with his thighs drawn up, in a half stupid state; he could be aroused by an effort, and would utter a peevish, irritable cry, jerk his arms, roll over on the opposite side, and lapse again into slumber. He refused all nourishment. His urine was drawn by catheter. At the end of twenty-four hours he became brighter, began to look about him, and drank his milk. By the fourth day there was marked improvement; he talked intelligently and asked questions, but his memory was deficient. By the eighth day (August 5) he seemed almost natural, except for slight restlessness and occasional lapse of memory. His eyes were normal, and there was no paralysis. On the evening of this day slight twitching of the right foot and leg was noticed. On the ninth day this twitching was more noticeable, and in the evening it had extended to the right hand. There appeared to be no paralysis. During the night he had an epileptic convulsion, beginning in the right foot and becoming general, followed by stupidity lasting half an hour. On the morning of the tenth day (August 7) another very short convulsion occurred. I decided in the afternoon to operate, and to expose the lower and posterior part of the motor area of the left side, as the symptoms indicated pressure at this point.

The diagnosis was pressure by a blood clot. On shaving the head no contusion or laceration of the scalp was found. By dissecting up a semicircular scalpflap the bone was exposed over the fissure of Rolando. There was no evidence of fracture or injury of the skull. With a three-quarter inch trephine a button of bone was removed from over the center of the fissure of Rolando. Immediately underneath, a blood clot was found extending downwards and backwards. The opening in the skull was enlarged in this direction, following the clot until an opening 2 by 2½ inches was made. The clot was then removed in two or three pieces. It was oval in shape, three-quarters of an inch thick at the center and thinning out towards the edges.

The surface of the dura mater under the clot was roughened, but was not lacerated or apparently injured in any way. It was not opened. A director was swept around between the skull and dura, but no additional clot or sign of fracture could be discovered. The bone was not replaced. The scalp-flap was replaced and sutured.

The patient was returned to his bed at 4 p. m., and rapidly recovered from the anæsthesia. At 7 p. m. there was a slight convulsion, limited to the right leg and hand. No farther manifestation of cerebral irritation showed itself, and the patient made a rapid and uneventful convalescence. He has been perfectly well ever since, earns his living as a bricklayer, and does not hesitate to go on an occasional spree.

Case 2. Extra-dural hemorrhage; convulsions and paralysis; trephining; recovery.—Boy, age 6. On August 11, 1890, the patient fell down stairs and was supposed to have struck his head. He was unconscious when picked up, and remained partially unconscious until admitted to the Presbyterian Hospital, twenty hours later. For forty-eight hours after admission he lay quietly on his right side, with thighs and arms flexed, and was apparently unconscious, unless when disturbed, when he became irritable and restless, uttering sharp peevish cries and pushing away his nourishment. Temperature ranged between 100° and 102°, pulse 110 to 120. Pupils were equal and reacted. There was no sign of paralysis. The scalp was contused over the right temporal region. On the fourth day he became brighter, was less irritable, answered questions in a semirational manner, and drank his milk when ordered to do so.

On August 17, the sixth day from the date of the injury, his general mental condition was very much improved; he talked intelligently, asked for food, and seemed quite happy. It was noticed, however, that sensation in the left arm and leg did not seem so acute as on the other side; there was no impairment of motion. On the next day (seventh), in the morning, he had a distinct convulsion, limited to the left upper extremity, lasting one minute and followed by an apathetic state for half an hour. In the afternoon there was another convulsion, beginning in the left side of face and forearm and then involving the entire left upper extremity. Sensation markedly diminished in the left arm and leg. The left upper and lower extremities towards evening were completely paralysed. There was left-sided facial paralysis. During the night two similar convulsions occurred. On August 19 (eighth day) two convulsions, beginning in the left hand and foot and involving the left upper and lower extremity and left side of face. The boy's mental condition remained bright. No disturbance of sight, taste, or smell could be discovered. The eyes were normal. Complete paralysis of left upper and lower extremity persisted. Temperature 100°, pulse 90.

The diagnosis was made of blood-clot pressure on the motor area for left arm, leg, and face, and after consultation with Dr. W. G. Thompson immediate operation was decided on. The contused scalp had recovered, and there was no external sign of injury. After anæsthetization a semilunar scalp flap was dissected free and the skull exposed over the fissure of Rolando. The bone was bared over a space 2½ by 3 inches, but no sign of injury found. With a three-quarter inch trephine a button of bone was removed at a point over the fissure of Rolando 2½ inches from the median line. On removal of the button, in the anterior half of the circle the dura appeared normal, but in the posterior inferior quadrant it was concealed by a blood clot. The clot extended downwards and backwards, and the opening in the skull was enlarged by Rougeur forceps in this direction until it measured 2½ inches in the antero-posterior direction, and 2 inches from above downwards. It was then seen that a fissure of the skull ran into the posterior part of the opening. On enlarging the scalp flap it was seen that this fissure ran from above downwards and slightly forwards, and at its upper extremity was joined by another fissure running from above downwards and backwards. The portion of bone between the two fissures was triangular in shape, the apex 1½ inches from the median line. This triangle of bone attached at the base was 1½ inches long and was cut away. Under it was brain tissue deprived of the dura and somewhat lacerated. The rent in the dura was 1½ inches long, and the edges having receded, left bare an area of brain corresponding with the triangle of bone removed.

The clot, which in the meantime had been removed, was oval in shape, 2½ by 3 inches, and about one-half inch thick at its center. The cavity was irrigated with boro-salicylic solution, the scalp flap returned and sutured except at the lower posterior angle, where a rubber drain was inserted. No attempt was made to suture the rent in the dura, as it was found impossible to approximate the edges, and the brain tissue at this point appeared to be superficially disintegrated.

The patient recovered quickly from the anæsthetic, and in his struggles he moved decidedly, though feebly, the left hand and forearm which had been absolutely paralyzed before the operation, and which had lain limp and motionless when he was fighting vigorously with his right hand and arm while inhaling the ether. This ability to move the left arm remained only for a short time, and then for the next twelve hours the paralysis appeared as complete as before the operation. He remained, however, bright mentally, and there were no convulsions; indeed after the operation not a single convulsive movement occurred.

At the end of twenty-four hours he could move his left arm with distinct force.

and very feebly his left foot. Sensation remained sluggish. On the fourth day after operation there was a marked improvement in his muscular power. There was a discharge of broken down brain tissue through the tube, and apparently a tendency to hernia cerebri. On August 26th (seventh day) this had ceased, and the paralysis of sensation and motion had almost disappeared. At the end of two weeks the boy was out of bed, without sign of paralysis. He has been in good health ever since, has attended school, is bright at his lessons and entirely free from pain, convulsive movements, or paralysis of either sensation or motion.

Case 3. Trephining; drainage of lateral ventricle; recovery.—Male, age 29, florist, gives a history of occasional attacks of unconsciousness ever since he was 12 years of age. He describes them as beginning with a sudden pain in the cardial region, followed by tumultuous beating of his heart, and ending in syncope or unconsciousness, which lasted for a few seconds and left him weak and exhausted. Convulsive movements had never been noticed. These attacks were very infrequent, sometimes two or three years intervening between them. The patient had always been of a nervous and excitable temperament, and, from the history, it was doubtful if the attacks were true epilepsy. His general health had been fairly good up to the time of an accident, which occurred on October 29, 1892. On that day while carrying a stove down stairs he was pushed from behind and precipitated to the foot of the stairs. He was stunned for a minute or so, but did not lose consciousness. A short time afterwards, on account of the hemorrhage from a scalp wound, he was brought to the Presbyterian Hospital.

On admission (October 29, 1892) two scalp wounds were found in the occipital region, each about 2 inches long. There was an extravasation of blood in the left eye and hemorrhage from the left ear. He was unable to raise his left arm. For the next few days he was very stupid. He would answer questions, but, unless aroused, he took no notice of his surroundings. His temperature ranged between 99½° and 100½°. The paralysis of the left arm gradually disappeared, and mentally he became brighter, though complaining of severe headache.

By November 10 the paralysis had entirely disappeared, and, though somewhat stupid and dazed, he was allowed to sit up. While sitting at the side of the bed in a chair he had a general convulsion, lasting ten minutes, followed by an apathetic condition for a couple of hours afterwards, and by slight anæsthesia of the left arm. For the following two weeks he complained of headache and dizziness, but his mental state gradually improved. He had no further convulsive movements until December 3, when a general convulsion occurred, lasting two minutes. It was followed by complete anæsthesia of his left arm and leg, and hyperæsthesia of the right side, and marked tenderness of the cicatrix in the occipital region. The reflexes on the left side were absent and on the right side exaggerated, where there was also marked ankle clonus. On the following day these symptoms still persisted, and, in addition, partial loss of power of his left hand was noticed, and extreme sensitiveness of his right eye to light. Gradual improvement took place, and in forty-eight hours more these signs had entirely disappeared. He was still, however, stupid and at times excitable, but on December 7 he felt well enough to leave the hospital, though strongly urged not to do so. He remained at home for nearly a month, during which time he had two convulsions. Immediately after his second convulsion (January 4, 1893) he was brought into the medical side of the hospital in an extremely excitable and yet somewhat dazed condition. Temperature 101°, pulse 100.

On January 5, a general convulsion lasting six minutes; January 11, a general convulsion; January 17, a general convulsion; January 18, two general convulsions. From the 17th to the 25th a general convulsion occurred every morning, and often a second one at night. The convulsions lasted three to ten minutes and were very violent. There was no regularity in the muscles which were first affected. His mental state continued to grow worse. His memory was entirely lost; at times he lay in a stupid, almost semicomatose state, and at times was excited and delirious. He complained of pain in the back of his head, and the slightest pressure on the occipital cicatrix caused him to cry out with pain. His temperature ranged between 99° and 100½°, pulse between 85 and 100. After January 25 he became steadily worse; the convulsions became more frequent, averaging five in the twenty-four hours; his stupor increased and he became quite irrational, sometimes for an hour or so remaining in a state of semicoma, and then again becoming very restless and noisy.

On January 28 Dr. A. H. Smith, the attending physician, felt that unless relief could be derived from operation he could not live more than a week or two, and on the next day he was transferred to my service on the surgical side. In the meantime he had been examined by a number of neurologists and surgeons, and most of their diagnoses inclined toward syphilitic gumma or general paresis. Operative interference was, in the opinion of all of them, contraindicated. Dr. Smith, however, sent him to me, in the hope that he might be benefited. He remained under observation for three days more, during which time his symptoms remained very much

the same, with the exception that his temperature ranged between 100° and 101° and his pulse increased in frequency (110). He was at no time rational, lying for part of the time in a semicomatose state, and then again he became excited and delirious, imagining himself persecuted, and making violent efforts to get out of bed. He was very hyperæsthetic over his whole body, but especially so on the back of his head, and most markedly at the seat of the cicatrix in the right occipital region. His eyes were normal. His tendon reflexes were greatly exaggerated.

As he was daily losing ground both physically and mentally, I decided, on January 31, to do an exploratory trephining. He was anæsthetized with chloroform, and a semicircular scalp flap was raised, the cicatrix being in the center. This cicatrix, which was situated just above the middle of the superior curved line of the right side, was found adherent to the bone. On exposing the bone, a roughening and what seemed to be a stellate cicatrix was found. At this point, which was just above the lateral sinus, with a 1-inch trephine a button of bone was removed. The inner surface of the button was roughened, but the elevations were not more than one-tenth of an inch, and certainly could have produced no depression of either the dura mater or brain. The dura was found thickened and roughened over an area three-quarters of an inch square, being perhaps twice its normal thickness. By rongeur forceps the opening was enlarged mainly upwards and inwards. A flap of dura was raised. No evidences of clot were found and the pia mater looked normal. There was evidently, however, a great amount of intracranial pressure. The brain bulged out through the opening in the skull as if there was not room for it inside the cranium. The cerebral tissue covered by pia mater projected through the opening in the skull half an inch beyond the external surface of the bone. Even after sitting the patient bolt upright this bulging was still very noticeable.

This extreme intracranial pressure was naturally supposed to be due to pressure of fluid, as no tumor or hardness could be felt on palpation of the brain substance, which, though congested, did not appear unnatural. A hypodermic needle was thrust into the brain in three directions, but no pus or other fluid was obtained. It was then decided to tap the lateral ventricle, and for this purpose a long hypodermic needle was passed into the right lateral ventricle, and about an ounce of thin, straw-colored fluid removed. The needle of the aspirating syringe was then withdrawn and a trochar and canula, made of aluminum, thrust into the ventricle, and the canula left for permanent drainage. About thirty minutes more were consumed before the final dressings were applied, and during this time the fluid continued to issue from the canula at the rate of a drop every four or five seconds. It was estimated that nearly an ounce escaped in this manner. The canula was carried out through an opening in the middle of the flaps of dura and scalp, which were each returned and sutured. The patient recovered slowly from the operation, and for the following twenty-four hours was stupid and somewhat restless. In the second twenty-four hours he was brighter, though still restless and irritable. At the end of forty-eight hours the canula, which had been so arranged by fixation to pads of gauze that it could not slip farther out or farther in, was removed. From the amount of moisture on the pad, which absorbed all the ventricle fluid, it was estimated that between 1 and 2 ounces had escaped. This estimate, however, is unreliable, and a much greater amount may have escaped.

After the third day (February 3) the patient improved rapidly. There had been no signs of convulsive movements since the operation, and he remained entirely free from even twitching of the muscles during his convalescence. At the end of a week he was quite bright and cheerful, talked intelligently, asked for food, was entirely free from delirium or delusions, and had perfect control of himself. The reflexes seemed to have returned to their normal state, the hyperæsthesia had disappeared, there was no sign of paralysis, and he was able to read his bedside notes. His eyes were examined and found normal. His memory was still defective, and he complained of occasional headache. At the end of two weeks the patient was out of bed, bright and cheerful. At the end of a month (March 1) he was apparently perfectly well, and made himself very useful in the work of the ward. His memory of events during the past year was defective, but otherwise he seemed well. On one or two occasions after excitement he complained of headache, but otherwise had no pain. On March 24, after an exciting interview with some of his friends, he had some twitching of the muscles of the face and hands, but no distinct convulsion. On March 28 he went out on a pass and was brought back by ambulance in a very stupid state, evidently caused by alcohol. On April 3 he left the hospital, commenced drinking, and in the evening was carried to another hospital in a condition of semicoma.

Alcoholic intoxication was, however, evidently the cause of his mental state, as, a day later, he resumed work. He has reported to me within a week, seven months after operation. He has been at work for the past five months, and has not missed a single day. His health is perfect, he looks bright and happy, and his employers report that he is intelligent and trustworthy, and that his memory is good. He has

no headache and no tenderness of the cicatrix. He has been intoxicated more than once without bad consequences. Indeed, up to the present time he is perfectly cured, and there seems to be every prospect that the cure will be permanent.

There can be no doubt but that the operation saved this patient. It is difficult to name the disease or lesions which caused his grave symptoms. It is probable, I think, that the cicatrix in the dura was the cause of the accumulation of intracranial fluid. In many ways his symptoms resemble those of the disease which has been described under the name of meningitis serosa.

Case 4. Subdural (organized) clot; epilepsy; trephining.—Female, age 6½ years, was kindly referred to me by Dr. M. A. Starr. The family history is good, with the exception of the maternal grandmother, who was an epileptic. The mother reports that the child's health has been good, with the exception of the fits. She states that at the age of 1½ years the child had a series of convulsions, coming on suddenly without apparent cause and lasting several hours. As a result there was a partial paralysis of the right arm and leg which persisted for several weeks and then disappeared. The next convulsion occurred at the age of 4 years, and one fit followed another for two or three hours, and resulted in a weakness of the right hand which lasted for a few days only. During the next six months she was perfectly well. At 4½ there was another convulsion without resulting paralysis, and at 5 years another severe convulsion, since which time she has remained partially paralyzed in her right arm and leg. For nearly a year no further convulsions occurred, though the paresis remained.

For six months previous to her entrance into the hospital (since September, 1892) she has had what the mother calls "spasms," in which the head turned always to the right, and convulsive twitching of the right hand and occasionally of the right foot followed. For the first four months when she was without treatment these averaged ten in the twenty-four hours; since treatment has been carried out the average number has been four or five.

On examination there was marked atrophy of the muscles of the right arm and forearm. She had very little use of the right upper extremity, especially of the hand. At times there was marked rigidity of the muscles of the hand and forearm, the fingers and thumb being flexed and tightly clinched in the palm. The circulation of the hand was impaired. Occasionally she could hold a large object in her right hand, but as a rule she was unable to take hold of any article. At times athetoid movements were present. There was slight atrophy of the muscles of the right leg and foot, and a distinct dropping of the toes (hemiplegiac gait). Mentally the child is bright, though very bashful; her eyes normal and general nourishment good.

Dr. Starr had made the diagnosis of pressure on the motor area for the right arm and leg, and sent her to me for operation. He advised an opening to be made over the arm center, and accordingly, after reflection of a scalp flap with a 1-inch trephine, a button of bone was removed over the fissure of Rolando about 1½ to 2 inches to the left of the median line. On removal of the bone the dura was found to have been adherent to its under surface. By rougeur forceps the opening in the skull was enlarged downwards and forwards to double its original size. The dura seemed to pulsate less vigorously than usual. It was incised along the upper border of the opening and a flap turned downwards. As the dura was reflected its under surface was seen to be rougher than normal, and lying on top of the pia mater was seen a translucent reddish membrane. This membrane, which was about the thickness of a sheet of note paper, covered the area of brain exposed, and extended beyond. It was lifted up and removed, but there remained a border which extended beyond the opening in the skull for about three-quarters of an inch, except at its lower part. This was afterwards removed by a small spoon from under the dura, the patient's head being elevated. So-called oedema of the pia was marked, this membrane being lifted off the brain by a layer of fluid nearly one-half inch deep. The pia was incised between the veins in two or three places, and several drachms of fluid oozed out. As the fluid poured out it was seen that this part of the brain was depressed, as if the convolutions at this point were atrophied. The brain, on palpation, appeared normal, and there was no justification for further exploration. The flap of dura was replaced and sutured, as was also the scalp flap. The bone was not returned.

The child recovered quickly from the operation and showed very little shock. For three weeks following there was no special change for the worse or the better. The convulsions continued as before, as did the paralysis. It is now five months since the operation. The child has gained considerably in weight and appears brighter, but the convulsions have not been modified by the operation; they occur as frequently and their character is the same. An improvement, however, has taken place in the paralyzed muscles; the child walks without a limp, and she can now easily grasp objects with her paralyzed hand. The muscles are still weak and lack proper coordination, but there is undoubtedly an improvement. I should consider the prognosis bad as far as the convulsions are concerned, but I should expect a farther

improvement of the paralysis. The membrane removed was undoubtedly an organized blood clot and the most probable cause of the hemorrhage was a pachymeningitis hemorrhagica.

Within the last three months I have trephined three other patients for epilepsy. All have recovered from the operation, but it is as yet too soon to report on the results. The mere removal of a button of bone from the skull seems to improve nearly all epileptics for a few months, and it is rather misleading to report on the condition of these patients before sufficient time has elapsed for the disappearance of the amelioration which may be attributed to the operation *per se*.

CARBUNCLE: ITS ETIOLOGY, PATHOLOGY, AND TREATMENT.

By D. W. Graham, M. D., Chicago, Ill.

Carbuncle was formerly looked upon as a peculiar mysterious disease, having a pathological process of its own with little or no relationship to any other disease either in its etiology, its pathology, or its indications for treatment.

The teaching and the practice of the present day indicate that we are still in bondage to the traditions of the older pathology to some extent in this respect, this being one of the more common diseases which have received scant attention on account of the allurements of visceral surgery and the rewards of work and study in the newer fields.

A conviction that there are established facts and available knowledge respecting this disease which are not fully reflected in the views and the practice of to-day is sufficient justification for an effort to ascertain and correlate what is known of the cause, nature, and treatment of carbuncle.

The observation has often been made, and should be reiterated, that the names anthrax and malignant pustule should no longer be used interchangeably with carbuncle. To avoid confusion the latter term should be reserved exclusively to designate the disease under consideration, while the former should be applied only to that disease of the lower animals which is contagious, sometimes communicated to man, and is caused by the anthrax bacillus.

Etiology.—Carbuncle is a disease of microbic origin, like all of its class. This has been demonstrated by the researches of Gawé, Bockhart, Baum, and others.

The micro-organism most frequently found is the staphylococcus aureus. In the minority of cases there are present also the staphylococcus albus or the streptococcus pyogenes or the two together with the former, but always outnumbered by it. The coccus may enter the skin through the hair follicles, the sebaceous gland ducts, the sweat glands, or an abrasion of the epidermis. It is easy to argue on the grounds of analogy that the organism may enter also through the alimentary canal or the respiratory tract. We are nowhere more in bondage to the traditions of the elders than in the belief that this disease is of constitutional origin. The notion that it is a disease of the cachectic, the alcoholic, the tubercular, and the diabetic was easily believed and necessarily prominent before local causes were demonstrated. The most that can be rightly claimed for the constitutional factor is that it increases the vulnerability of the tissues and predisposes to acute suppurations in general rather than to carbuncle in particular. Even the diabetic, so prominently associated with carbuncle, does not often have the disease.

The writer believes, with others, that the systemic vices are greatly overrated as etiological factors, and, though no statistics are at hand to prove it, it is even believed that the disease is not found more often, relatively, in the cachectic classes than in those of good health. The association of these constitutional conditions with carbuncle in a causative relation is probably partly accounted for by the fact that sta-

tistics used by writers and teachers have been collected more from the older large public hospitals and almshouses rather than from private practice and the smaller modern private hospitals. Whatever may be the exact facts in relation to this question, it is certain that whoever ignores the local origin and local nature of the disease is handicapped and disarmed for the proper treatment of his patient.

Carbuncle is a disease of middle life, while its near relative, furuncle, is preeminently a disease of the adolescent.

Anatomy and pathology.—Nosologically carbuncle is one of the acute suppurative inflammatives of connective tissue, and hence is generically related to osteomyelites, parenchymatous abscess, acute abscess, furuncle, and other suppurative diseases of the skin. The essential unity of the group is shown when we consider that all have a local origin, all involve the same histological structure, and all are due to the invasion of the same pus coccus, or at least one of the pyogenic cocci. The differences in clinical history, the divergence in pathological process, and the various modes of termination which are found when we compare the several diseases of this generic group with each other are determined by differences in the anatomical structure or region concerned. These differences are quite as marked in the skin of different regions of the body when they are compared with each other as are those found in one organ when compared with other organs. These variations in histological anatomy relate to thickness, density, toughness, elasticity, vascularity, the surrounding attachments, and the amount and mode of disposition of the adipose tissue.

It is these variations in histological structures of the skin in different regions of the body or the structural differences in the various strata of the skin in a given region that determine whether in a given case of invasion by the pyogenic coccus we shall have a superficial pustulation, as impetigo; or a deeper and more extensive suppuration process, as furuncle; or a still more deeply seated and extensive one, as acute subcutaneous abscess or carbuncle, as the case may be.

When the coccus invades the mouth of the hair follicle, sebaceous gland, or sweat gland, and is arrested there, we have impetigo, or one of its congeners. There is little tension, no stasis, no obstruction to the outflow of fluids or pus, and no slough.

When the deepest part of the epithelial structures of the follicle or the sebaceous or sweat gland is invaded a true furuncle is the result. Here there is obstruction to the outflow of fluids and pus on account of the depth and partial closure of the passage way. Hence we have tension, stasis, liquefaction (pus), a limiting wall, and in the center a conelike slough, which consists of the remnants of the gland or follicle surrounded by as yet undigested connective tissue, especially fibers of the yellow elastic tissue.

But when the pus coccus passes beyond the epithelial layer of the skin into the cutis vera, the result is either an acute abscess, with its circumscribed cavity filled with digested connective tissue and inflammatory product, or, on the other hand, a carbuncle, with its dense infiltrated mass of undigested connective tissue without any circumscribed cavity. Whether it be an abscess or a carbuncle will depend on the histological structure of the skin of the particular region involved. The region of predilection of carbuncle, is "the dense and fibrous integuments over the posterior median line of the body." The skin of this region is characterized by (1) its extreme thickness, especially the relative thickness of the cutis vera; (2) the aponeurotic-like density of the papillary layer, and its having few and small openings; (3) the more direct connection of the subcutaneous tissue with the reticular part of the true skin as one continuous structure; (4) the number and size of the polygonal spaces found in the subcutaneous and reticular strata, caused by the diverging and interlacing bundles of dense fibrous tissue which make up the framework of these strata. These polygonal spaces are chiefly occupied by adipose tissue constituting the *fasciculus adiposus*, and a delicate network of fine connective tissue; (5) the presence of Warren's fat column, extending from the adipose tissue

below to the base of the follicles of the lanugo hairs above, with their horizontal branches; (6) the dense, tendon-like, cone-shaped, fibrous bundles which extend from the base of the adipose column obliquely, to be inserted into the muscular fascia beneath.

The pus coccus having passed down and invaded these tissues, a focus of inflammation is begun, and we have all the factors and conditions necessary for the production of a typical carbuncle. The delicate network of arcolar adipose tissue succumbs readily and liquefies, and as tension increases pus is forced to the surface through the slender adipose columns into the hair follicles as the only means of escape. Thus we have the numerous pus points and eventually the cribriform condition of the surface of the skin, so characteristic of carbuncle. As tension increases the inflammation is forced to extend laterally farther and farther from the original focus through the polygonal spaces and channels occupied by the rapidly diminishing delicate connective tissues and fat. Thus we have the characteristic peripheral extension and the broad flat indurated mass passed between the still resisting dense papillary layer above and the muscular fascia beneath, to which it is still firmly bound by the tendon-like cones of fibrous tissue.

If now an incision be made into this mass, there would be seen the numerous small pus points and channels but no proper pus cavity, both of which conditions are well recognized features of carbuncle. The process continues until the skin over the original focus becomes necrotic and sloughs away, thus relieving the tension and peripheral pressure, and we have the first step towards the natural limitation of the disease. But if the infiltration and induration have already extended so far as not to be influenced by this diminution of tension, it will continue to spread indefinitely, or until the sloughing process following in its wake has gained on it sufficiently to entirely arrest the peripheral tension. After all the long-resisting dense fibrous parts described above which began to die with the skin have yielded and sloughed piecemeal, we have the crater-like cavity coextensive with the indurated mass.

It is said carbuncle may occur on any part of the body, but this is not correct of true typical carbuncle conforming to a fixed definition.

We cannot have a typical carbuncle without continued tension in inflamed tissues, one part of which resists the digestive or liquefying process of suppuration longer than other parts.

Many subcutaneous inflammations are loosely called carbuncles when they are simply abscesses.

But as the characteristic features of the carbuncle skin are only typical in certain regions of the body, and are found more or less perfectly or imperfectly in other regions, it will often happen that a suppurative inflammation of the skin and subcutaneous tissue cannot be definitely classed either as a carbuncle, an abscess, or a furuncle; or that the characteristics of one may predominate, while those of the other are present in some degree.

The general indication for treatment is the same as in any other disease, viz, to limit its extent and duration.

The special indications are to arrest suppuration and to prevent septicæmia. The history of means and methods of treating carbuncle would fill a volume. Palliative means are useful and to be recommended if nothing better can be done. Many good surgeons advocate a purely expectant course and discard all active means, relying on internal medication, and treating it as a self-limited disease, not to be interfered with. Most surgeons, however, recognize the necessity of doing something to hasten sloughing in order to relieve tension, and thus limit the extent of the disease and prevent absorption of disease products. Caustics, incisions, single, multiple subcutaneous, and the time-honored crucial incision, are relied on. These are to be recommended also if nothing more efficient can be done. But they are all inadequate to fulfill the indication, although they accomplish something.

Scraping, as advocated by Page and Owens (British Med. Journal, March 24, 1888), and Mr. Teale, of Leeds (Medico-Chirurgical Journal, January, 1887), and even the "excision and scraping" as advocated by Reubten Parker (British Med. Journal, March 31, 1888), are valuable resources in certain stages after sloughing has begun; but they are applicable only to those cases where the disease has ceased to extend.

The injection of various antiseptics as advocated by some would hardly be relied on by any one who had an adequate conception of the anatomy and nature of the disease. But it is not my purpose to review and compare discarded or prevalent methods. As a substitute for all of these I would advocate total extirpation of the indurated mass, as we would remove a benign tumor.

If this is done early the entire skin can be saved. If it is done later there will be some loss of skin over the original focus, but the patient will be saved from all the dangers of septicæmia, the cause of death in carbuncle, usually miscalled exhaustion.

If the patient already have septicæmia, and there remains a ring of indurated tissue beyond the sloughing center, extirpation is still the best means of saving the patient's life. It should be resorted to in all cases, whatever the stage of progress, except those in which the disease has clearly run its course, where the excision and scraping of ruptured parts would be sufficient.

It is a rational, life-saving, and time-saving method, and will commend itself to all who try it. All the reasons that call for amputation of a gangrenous limb can be urged in favor of total extirpation of carbuncle.

The technique of the operation needs but few words. Anæsthesia is required which should be as brief as possible, and not profound, if the patient already suffers from septicemia.

A crucial incision should extend to just beyond the borders of the induration. The four flaps are to be dissected up to the limits of the disease, which can usually be made out easily, contrary to what is usually taught. Then with volsella forceps and a knife the mass is readily dissected from its attachments to the deep fascia and removed entire, or in sections, according to its size and condition. The four flaps are then stitched together toward the center, more or less closely, according to the amount of necrosis and sloughing. When the extirpation is done early there will often be no loss of skin and but little subsequent discharge. There are no blood vessels in or under the skin in the carbuncular regions that should terrorize anyone.

A CONTRIBUTION TO RECTAL SURGERY AND BLOODLESS OPERATIONS OF MEMBRANEOUS AND LAX TISSUES BY MEANS OF AN ELASTIC QUILLED, OR WELTED SUTURE.

By H. M. BISHOP, M. D., Los Angeles, Cal.

For the removal of the larger hemorrhodial tumors, and of the complete or partial prolapse of the rectum, all past methods have failed in obtaining one or both of the desiderata of surgery, prevention of hemorrhage and primary union; the ligature, the ecraseur, the clamp and cautery, and Whitehead's operation, are either liable to a waste of blood primarily, or secondarily, or leave a granulating wound with the risk of infection or other unpleasant complications.

After seeking for many years to obviate these disadvantages, and to devise some means of harmlessly controlling hemorrhage while excising the tumors and redundant folds of the rectum, and likewise to hold in perfect and undisturbed coaptation the edges of the incisions, my endeavors have finally been satisfactorily rewarded.

It is now my custom after dilating the sphincter, to raise the hemorrhoidal projection or prolapsed membrane with vulsella, to gently clamp its base so as to par-

allel the approximated tissues and free them from plications; then, having left room between the clamp and adjacent healthy tissues, I apply on either side a sufficient length of rubber tubing 5 millimeters in diameter, having a central orifice of 1 millimeter; these are secured with catgut after the usual manner of the quilled suture, the clamp removed and the tissues divided close to the tubing. This makes a bloodless operation, plastic exudation soon unites the edges, the catgut softens in due time and permits the tubing to pass away, while the flexibility of the latter has adapted itself to its environment with the minimum of annoyance to the patient.

In cases of complete prolapsus or where any considerable section of the rectum is removed, after properly bringing down the folds, the same plan can be followed, by uniting internal and external circles of the tubing, applied just above and below the section to be excised, the elastic pressure sufficiently occluding the divided vessels without interfering with reparative processes, and leaving a smooth line of union. This, although resembling somewhat the modern enterorraphy, differs from it in the less rigidity and more suppleness of the supporting rings of union.

Other and more extended uses of this combined ligature and suture have suggested themselves. The coeleotomist might find it more eligible than the sectional tieings of the broad ligament now in vogue, with its puckerings of folds, and crowding into condensed distorted masses structures that are normally expanded, and whose severed edges would manifest less disposition to necrosis if kept unfolded and smoothly approximated while at the same time freed from the rigidity of the clamp. After a few days when the tubes had accomplished their object they could be slipped away from the softened catgut loops by a thread of silk left attached for that purpose, and drawn out through the vault of the vagina or other convenient locality.

Should it be necessary in any emergency to make use of more firmness than the simple tubing supplies, it can be furnished by passing a wire along the small aperture of the rubber tube.

For the closing of the abdominal incision and other long and deep wounds it may prove to be more advantageous than the usual interrupted suture, for it provides a more uniform and steady joining of the severed parts, deep as well as superficial, which accommodates itself to the various necessary bodily movements without permitting any variation of the relation between the parts engaged in the process of reuniting, and which must consequently result in a firmer line of union

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TAPPING OF THE LATERAL VENTRICLES OF THE BRAIN.

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The interesting train of symptoms, long known and recognized, of which the principal are: nystagmus, general convulsions, disturbance of the respiration, slowness of the pulse, vomiting, coma and death, find a solution in the acceptance of the theory of compromise of brain function by so-called intracranial compression. Whether an actual elevation of intracranial pressure be present, or whether the symptoms have their foundation in irritation of brain elements, by increased transudation, concerns us less than the possibility of restoring brain function, in part or in whole, by removing collections of cerebro-spinal fluid, blood, pus, or foreign matter. That this can be done practically upon the operating table with the same gratifying results as in the experimental laboratory has become a well-known fact. It is therefore not strange that operators should have adopted means of reaching compressing agents in the lateral ventricles, there known to exist.

Tapping for hydrocephalus through the fontanelle is so old a procedure that it can not be determined who first devised or practiced it. The publishing of the method

for tapping the ventricles, by means of trephining, is of more recent date, and the plans for the same have been technically perfected and shown to be thoroughly feasible and easy of accomplishment.

Dr. C. Wernicke in Lehrbuck der Gehirn Krankheiten, vol. 3, 1881, writes of meningitis, that—

The disease can get well by spontaneous retrogression. It is, therefore, often necessary to lengthen life in every possible manner, in order to gain sufficient time, that the chance of spontaneous retrogression may obtain. It seems in many cases the cause of death is an effusion into the ventricles, which has the tendency to increase even when the disease is in the stage of retrogression. This can be clinically determined, where the fontanelles are still open. Where this condition of things is present, operative interference is fully justifiable, the more so, as without it a fatal ending can, with the greatest certainty, be predicted. In such cases one will trephine and puncture the lateral ventricles. The returning powerful pulsation of the brain will indicate if the desired result has been obtained. If it becomes necessary, there should be no timidity about repeating the operation, or eventually performing it on both sides.

D. Lowson, M. D., of Hull, on April 10, 1885, before a branch of the British Medical Association, read a paper in which he recounts a case of hydrocephalus in a boy 7 years of age, paralyzed, blind, in constant pain, affected with occasional epilepsy, but intellect unimpaired. The skull was drilled, fluid aspirated, and constant drain established by means of silver cannula, to the end of which rubber tubing was attached leading under carbolic-acid fluid in a bottle placed lower than the head. Rapid improvement, with some movement of the limbs and some vision, was noted. In his sleep patient pulled out the cannula twice; the last time it could not be found. Died comatose the day after, the eighth after operation. Silver cannula found in the ventricle.

Dr. Phillip Zenner, of Cincinnati, in a paper on tumors of the brain, read before the Academy of Medicine, February 1, 1886, referred to tapping the ventricles, as a palliative measure in some cases of tumors of the cerebellum, and reports a case in which the operation was prevented by the sudden death of the patient; the autopsy made clear the certain benefit to be derived from such interference.

Ernst von Bergmann, in Die Chirurgische Behandlung von Gehirn Krankheiten, writing of the operative treatment of acute hydrocephalus from tubercular meningitis, states:

It is not the deposit of miliary nodules along the course of the vessels which causes the danger, but rather the inflammation of the plexus and its products—the acute effusion of fluid into the brain cavities. The intracranial pressure, through increase of ventricular cerebro-spinal fluid, becomes so great that it offers a hindrance, and at last an actual obstruction, to the entrance and progress of the blood. Naturally comes the thought to drain off the water, and thereby unburden and free the circulation.

Von Bergmann then describes the similarity of the deposit of miliary tubercle on the pia and peritoneum, both followed by great transudation. The well-known and remarkably good results following emptying the peritoneal cavity, with retrogression of the tubercular process, led him to think that the same benefit might accrue in puncturing and draining the ventricles. It was this reasoning that led him to operate, July 15, 1888, upon a case of tubercular meningitis in the stage of brain paralysis.

The patient lay in a deep stupor, with periods of restlessness and groaning; pulse 72 and intermittent; respiration of the Chayne-Stokes character, with very long intervals; in the contracted left arm convulsions; eyes closed, pupils dilated and without reaction. Immediately after the operation, pulse 104, regular; respiration 40 and regular. Evening of same day, patient takes nourishment, the eyes are opened, pupils less dilated and react against light. The patient died; yet the benefit to be derived from the operation was illustrated in a most striking manner.

Dr. W. W. Keen, of Philadelphia, has done more than any other in bringing the operation into prominence. His work is not based upon the results obtained by his predecessors. As he states, in the paper published in the Medical Record of Sep-

tember 20, 1890, he was led, November 7,1888, to propose the trephining, puncturing, and drainage of the lateral ventricles by the results shown at the autopsy of a case of tubercular meningitis which had been trephined for supposed abscess. A drainage tube had been introduced and found, post mortem, to reach within one-fourth inch of the distended ventricle, the same having produced no inflammation or irritation.

Dr. Keen reports three cases of his own upon which he did the proposed operation. The first was for threatened blindness from acute hydrocephalus, due to tumor of the cerebellum. The left side was first trephined and drained, and some twenty days after the right side. Irrigation of the ventricles, from side to side, without ill results, was demonstrated in this case. This patient died, the post mortem revealing a sarcoma of the left lobe of the cerebellum. The second case was one of hydrocephalus of about three years standing, the mental condition being poor. The left ventricle was tapped, improving paresis of the right arm. Convulsions set in the next day, thought to be due to too rapid emptying of ventricle. It was decided to replace the fluid, which being done had the result of stopping convulsions. This was repeated eight times, each time stopping the convulsions. The autopsy revealed extensive hydrocephalic distention. The third case was one of unilateral acute internal hydrocephalus of left ventricle. The patient, being in extremis, died four hours after operation.

Dr. Samuel Ayres, on December 4, 1888, operated upon an imbecile child 5 years old; disease beginning during third month of life with convulsions. Enlarged head with closed fontanelles and sutures, aphasia, total blindness, idiotic smiling, rotary movement of head, grinding of teeth, bowel and bladder incontinence. Had never walked nor stood alone. Trephining over coronal suture one and a half inch to right of median line; distinct pulsation; fine trocar introduced through dura downward, backward, and inward to a depth of two and a half inches. One ounce of fluid removed from ventricles and smaller quantity from space between dura and brain. Oozing of fluid for several days from puncture in dura. Pulse before operation 120 to 140, after operation 140; temperature 101.8°. Child could stand alone two or three days after. Partial restoration of sight; would wink on finger being passed before eyes. In three weeks was gradually able to walk alone across room; less irritable and could sleep well; no development of speech; no control of sphincters. Three months after operation, continued improvement.

Dr. Keen reports 2 cases by Mr. Mayo Robson, of Leeds. The first of these was a boy of 10 years, with high temperature, right hemiplegia and aphasia; twitching of limbs of right side; double optic neuritis. Operation October 7, 1889. One and one-half inch trephine used over motor centers of right side; no pus being found, a needle was pushed into the lateral ventricle and ten drams of clear liquid evacuated. Patient showed continual improvement; six months later was in good health. The second case was that of an infant with acute hydrocephalus; the drainage gave relief, but the child died in convulsions on the third day.

A. Broca, of Paris, published two cases in the Revue de Chirug. under the head of "Drainage of the ventricles for hydrocephalus," one of his own, the other by Thiriar, of Brussels. His own case was one of hydrocephalus with contracture of the left arm; drainage of right ventricle. Contracture of arm disappeared; object of operation was consequently reached.

Thiriar's was a case of hydrocephalus of three years' standing. Tapping was followed by diminution in circumference of head and a depression of fontanelles. Patient died; autopsy showed great distention of ventricles.

To these I will add two cases within my own experience.

Case 1.—Charles K., a hod-carrier, March 8, 1891, at about 3 p. m., was struck upon the head by several brick falling from the second story of a building. He is said to have been completely unconscious immediately after the hurt, but gradually regained partial consciousness; could make effort at answering questions and move

his limbs. The disability being deemed of a passing nature, he was placed on some boards in the engine-room of the building upon which he had been at work. At 5 o'clock p. m., two hours after injury, there was so little improvement shown that he was taken to his home, where a physician advised removal to a hospital. He arrived at St. Elizabeth Hospital at 9 p. m., and was placed in my service.

House surgeon, Dr. Palmer, made the following notes: Still dressed in working clothes, a well-developed muscular man lay without motion on the table. Pulse 30 to 40, full and irregular; respiration 8 to 10 per minute, irregular and somewhat sterterous. Upon questioning him loudly he mutters unintelligibly. Pupils dilated; respond feebly to light, and on holding light closely the lids are shut tightly; seems to have good motion on right; diminution in motive power of left side. Owing to great amount of effusion into scalp, no definite diagnosis of fracture could be made. Several contusions, with great swelling above and in front of right ear.

Upon reaching the patient, paresis of left side was so marked that it was decided to trephine over right motor centers. After the head was prepared in the usual way a U-shaped incision was made, beginning at the frontal eminence, running backward to median line 4 inches, and returning anterior to ear, the flap being about 2½ inches wide. Previous to this a row of interlocked alternate white and black sutures, about one-fourth inch outside line of incision, were tied to control the hemorrhage. The flap, separated from the skull, was wrapped in gauze and laid upon forehead, exposing a linear fracture commencing one-half inch to right of sagittal and the same distance posterior to the coronal suture, involving the latter suture as far as the incision permitted observation. A 1½-inch trephine was so placed that the anterior margin reached the coronal suture and superior within one-half inch of sagittal suture, and a button of bone removed. No epidural clot or hemorrhage, but great bulging of dura, of exceedingly tense feel and without pulsation. A meningeal artery crossing the trephine opening was tied, and it made the base of a flap in the dura. The brain substance protruded beyond the skull opening about one-fourth inch and was with difficulty replaced. At the moment of bulging, pulse and respiration became more rapid; when pressed back pulse and respiration were slower. No subdural clot or hemorrhage as far as the finger could explore; a normal amount of cerebral fluid escaped. On account of the above conditions, a hydrops ventriculi was diagnosed and tapping of the ventricles decided upon.

No trocar being at hand, an aspirating needle corresponding to No. 3 American catheter scale was used with syringe attached. The direction of introduction was slightly backward and toward the median line. At a depth of 2½ inches fluid was reached, the syringe was detached from needle, and about 3 ounces of clear ventricular fluid gradually drained off. No anæsthetic was given the patient after the incision through the scalp. After the drainage of the ventricles, the respiration increased to 16 and the pulse to 120 per minute. There was a general reaction, the pupils became smaller, paresis was improved, and the patient was much more sensitive to pain, chloroform being necessary in the later stages of the operation. No further drainage was employed than a few strands of wicking, which was passed from the point of the brain puncture to the most dependent part of dural and skin flaps. The button of bone, which had been kept in sterilized water at a temperature of 100° F., was replaced and the scalp brought together with deep interrupted and superficial continued sutures and an aseptic dressing applied. The operation lasted one and three-quarter hours.

The following morning respirations were 18 and pulse 120 per minute; temperature 102° F. Patient was comatose, defecated and urinated unconsciously. At 5 o'clock p. m., twenty-six hours after injury and nineteen hours after operation, temperature rose to 105° and patient died suddenly, with no marked change in pulse and respiration up to that time.

At post mortem the dressings were found dry, save slight oozing; edges of scalp united; the pericranium adherent to button of bone, button adherent to dura, and edges of dura united. Upon removal of skull cap, a linear fracture was revealed, beginning as above indicated and extending along the coronal suture to the sphenoid bone, where it divided into several smaller fractures in the sphenoid and temporal bones. On removal of brain from cranial cavity an epidural clot was found under the squamous portion of temporal bone; there was also a similar-sized clot beneath right cerebellar lobe, which lobe was softened to a noticeable degree. The brain and meninges were much congested. The ventricles were empty and no trace of puncture was found. That the tapping was justifiable was shown by the improvement immediately afterwards. There was sufficient traumatism to cause death. The rise in temperature was ascribed to the extent of fracture, disorganization of cerebellar tissue, and resorption from blood clot.

Case 2.—Freddie McC., aged 13, was referred to me by Dr. Brower, to whom I am greatly indebted. The following history was gleaned: Parents respectively 42 and 43 years old, in good health; tubercular, specific, or malignant family taint denied. Mother has had but two children, the patient and a girl aged 10, who is bright, active, and well developed.

Until the age of 6 years the patient was apparently well, though precocious, attended school, learned quickly and easily, and was apt at acquiring vices and the use of profane language. In disposition he was combative, and was admired by all that knew him for being clever beyond his years. The history of present troubles began when in sixth year. At the time he fell from a wagon, striking upon the back of his head. Nothing was thought of the fall since the patient was at play soon after. He did not become unconscious, nor was there a sign of external injury nor any complaint of resulting pains. Two weeks after he became sick with a fever which lasted two weeks; was delirious; head was thrown back and at times he lay in an opisthotonos position. Intense jaundice developed, the duration of which is unknown. During entire illness there was no incontinence. Convalescence was slow, and during its period of three months patient was fretful and peevish; would, grasping the head with both hands, cry out in pain. He had delusions of varied character and spoke disconnectedly. In the third month after beginning of disease patient began to stammer in his speech, and had disordered and involuntary muscular movements and twitchings of face, trunk, and limbs. These increased to the extent that the child was unable to walk or stand. The case was diagnosed by the attending physician as one of chorea.

In about one year the patient gained sufficient strength to walk fairly well; but became subject to epileptoid seizures. When walking or standing the patient would fall and be unconcious for a moment, without convulsive movements; would however immediately get up and pursue the subject of occupation. These continued about one year and were followed by spells, during which patient seemed unconscious, the countenance staring, face flushed, followed by pallor. Patient had an ataxic walk, descended stairs with great difficulty, and was sleepless. The application of faradic current brought about some improvement. The power of speech was lost gradually to the extent that only single words could be articulated: Mamma, papa, the name of his little sister, and a few profane words. He was irritable and would laugh and cry without apparent cause. He was sent to school for a short time, but made no progress. There was, at this time, incontinence of urine and feces, but this symptom has disappeared.

The boy is well developed and muscular, 32 inches in height, without pubic or axillary hair. The reflexes are found to be normal, except exaggerated knee jerk; the walk is spastic, can walk alone but a few steps. Unilateral symptoms are present, the right side affected more than the left. Has habit of chewing right thumb, upon which callus has formed. Pupils are widely dilated and do not react to the light; a critical examination of them can not be made on account of the restlessness of the subject. Patient has occasional rise of temperature and vomiting. Pulse irregular, from 60 to 70; respiration 14 to 18, irregular and sighing.

Diagnosis.—Idiocy following hydrops of the ventricles, in turn due to chronic inflammation of the ventricular lining, as a result of cerebro-spinal meningitis. It was proposed to tap the ventricles. After due consideration it was accepted by the parents, to whom the dangerous and uncertain results had been explained. The operation was done May 4 at 11 o'clock a. m., Drs. Beck, Holland, and McKay being present, besides the house staff. Keene's posterior route for reaching the ventricles was selected, and it was decided to do it upon the left side.

The alternate white and black interlocked hæmostatic sutures were used. A U-shaped flap was made and separated from skull, wrapped in gauze and laid to one side. With a 1½-inch trephine there was removed a button of bone, the anterior margin 1½ inch posterior to coronal suture, the upper margin 1½ inches from saggital suture. The button was kept in sterilized water at a temperature of 100° F. The dura opened, a trocar, size No. 3 American catheter scale, was introduced almost directly downward and slightly forward to base of skull. The ventricle was reached at a depth of 1¼ to 1½ inches, as was shown by the outpour of clear ventricular fluid, of which 6 to 7 ounces escaped. A grating feel upon the trocar gave the impression that there might be present a ventricular calculus. In order to explore the cavity the handle of a scalpel was passed alongside of the trocar, a pair of closed forceps were introduced through the opening thus made, without being able to detect anything unusual. The index finger was next inserted into the ventricle, with no better result. It is, however, noteworthy that this can be done with safety, also that while the finger was in the brain there was great depression, weak and slow pulse and respiration, which improved upon withdrawal. A drainage tube one-fourth inch in diameter was passed into ventricle, and through the posterior part of wound. The ventricular fluid flowed freely and with distinct pulsation.

The dura was sutured with catgut and button of bone replaced, the scalp incision was closed, and a sterilized dressing applied. Time of operation was two hours. Before removal from the table there was noted a paralysis of right side, which persisted until death. The pupil of right eye smaller than left. Patient placed in bed, lay very quietly, passed urine involuntarily, but indicated to his mother when his bowels were to move. He recognized both his father and mother.

On day of operation, at 5 p. m., pulse 110, respiration variable and irregular between 40 and 50, temperature 102° in axilla; 8 p. m., pulse 120, respiration variable and irregular between 44 and 45, temperature 102° in axilla; May 5, 8 a. m., pulse 100, respiration variable and irregular 40, temperature 101.5° in axilla; 3:30 p. m., pulse weak, could not be counted, respiration 56, temperature 100° in axilla. At 8 p. m. patient was brought to dressing room to have a new dressing applied, the old being saturated with ventricular fluid. Upon exposure the wound was found in good condition. The edges of scalp united. The drainage tube was freely movable and discharged clear fluid with distinct pulsation. The external wound was cleansed and dressing applied; patient seemed more comfortable. At 11:30 p. m. died quietly without convulsions.

Post mortem was held the morning of the 6th of May. The body was rigid and the toes of the right foot were extended; the cornea of both eyes were opaque.

The dressing was removed, and no signs of sepsis were visible here or in any part of the wound. The sutures in the scalp were cut, and slight union was found throughout. There was also slight union between pericranium and cranium, also between pericranium and button. Button was adherent to the dura. One catgut suture in the dura had untied itself. The edges of the dura were united, and there were no signs of hernia of the brain. During the entire examination there was a free flow of ventricular fluid. The cranium was very thick, the button of bone being five-eighths inch in depth. The cranial sutures were raised above the surrounding bone.

The following pathological and anatomical description of brain and meninges was kindly furnished me by Dr. Beck, of this city:

The dura mater is much thickened; the inner side is smooth. The inner membranes are nowhere adherent, and are easily removed. On the left side of the skull, about 4 centimeters from the median line and in front of the coronal suture, in fact entering it, is an oblique opening in the skull about 2 centimeters in diameter; this was traversed by a band of solid connective tissue, which is united to the pericranium on the outside and the dura internally. The convolutions of the brain are narrow, especially in the parietal and occipital lobes, some of them being only 3 and 4 mm. broad, but the sulci deep. The convolutions are more ramified than usual, so that the normal configuration of the gyri and sulci is disordered. The island of Reil on both sides is softened and does not show any distinct gyri. The convolutions along the fissure of Rolando on the left side are very much lacking. The brain case is normal as regards the array of vessels and nerves.

The gray substance of the brain is very narrow. Both lateral ventricles, as well as the third, are enlarged to double their normal space. The ependyma shows the most remarkable change, the surface has the appearance of so-called chagrin. The cerebellum is disproportionately large to the cerebrum.

The microscopical examination of a part of tissue taken from the lateral ventricle where the chagrin tissue is most developed, shows the following from within out. The ependyma is thickened and undulating. Under this is a dense layer of connected tissue, and beneath this a zone of infiltrated leucocytes, both of which are characteristic of a chronic inflammation. The brain tissue is normal.

The pathological diagnosis is as follows: A partially defective cranium; micro gyri and a chronic internal hydrocephalus.

To follow up the literature of the operation of trephing and tapping the ventricles, I will cite the following case:

Dr. W. C. Dugan, before the Louisville Surgical Society, on December 12, 1892, reports the interesting case of a lady, 50 years old, suffering intense headache for eight to ten months. Gradual loss of hearing. Impairment of intellect; slowness of comprehension and in giving answers. Partial paralysis of right leg, incomplete loss of sensation in right arm, twitching of right side of face. Had two convulsions. Ocular examination reveals double choked disks. Diagnosis of tumor was made, probable seat, upper part of fissure of Rolando.

Exploratory operation over left parietal region, button of bone removed allowing dura to bulge greatly, of singularly hard and inelastic feel. The dura opened, brain tissue welled up as thick as the finger and impossible to return. Hypodermic needle found no fluid, but a grooved director being passed into ventricle 3 or more ounces of fluid escaped. As the fluid drained off, the brain tissue receded, and the finger could be passed easily between the dura and cortex; no tumor was discovered. The grooved director was passed through septum into opposite ventricle without finding fluid; without drainage the wound was dressed and the patient put to bed. Reacted well without shock; paralysis and loss of sensation relieved immediately.

Hearing has not returned. As the exact pathology of the accumulation of fluid was not understood, it was thought that tapping or aspiration may have to be repeated, on that account the button of bone was not replaced.

Dr. Theodore Diller reports a case operated upon by Dr. R. W. Stewart, for supposed tumor at base of brain, after an injury two years previous. Diffuse headache, drowsiness, left hemi-paresis, cerebellar titubation, disphagia, aphonia, and advanced optic neuritis. Operation to relieve intra cranial pressure, and find and remove tumor if possible. No tumor or depression of bone found, but great bulging and formidable protrusion of brain indicated intra cranial pressure. The ventricle was tapped and 2 ounces of clear fluid removed; drainage. Left paresis more marked after operation, and four or five convulsive seizures. Patient died thirty-six hours afterwards. Tumor, a sarcoma about the size of a walnut on left side of pons found at post mortem.

Verified by the results of dissections and trials upon the cadaver, the method of reaching the ventricles has been described in so lucid a manner by W. W. Keen that little can be added to his article published in the Medical News, of December 1, 1888. Three routes, anterior, lateral, and posterior, are given with the minutest details. To this paper I would refer those interested.

In a general way, where there is a point of election for reaching the ventricles, either of Keen's routes will make the attainment of the object easy. However, they should not be considered to be the only manner of finding them, nor is it necessary to have recourse to them, when the skull has been opened in a different place for injury or disease. From any point on the cerebral cortex it is not very difficult to penetrate to the normal ventricle, familiarity with its location and conformation being the principal requirement; it is extremely easy where the cavity has been enlarged as in chronic hydrocephalus.

At the post-mortem of Zenner's case, a trial puncture with a trocar three-fourths of an inch to the side of the median line and about 1 inch anterior to the line connecting the auditory orifices succeeded in reaching fluid at a depth of 1½ inches beyond the dura, but the operator succeeded equally well at several points posterior to this.

Broca made a cross incision through the pericranium and trephined three cm. above and three cm. behind the right ear meatus and introduced the trocar in the direction of the opposite ear meatus. He felt the brain consistence yield at a distance of four cm., a discharge of clear fluid following. Thiriar, by experiments on the cadavar, establishes the rule: To trephine 7½ cm. above the meatus auditorius externus and 1 cm. anterior to this line. These varied rules prove the truth of my previous assertion, that from different points on the cerebral cortex it is not difficult to reach the ventricles.

After the usual aseptic or antiseptic details of preparing the head, a straight, crucial or curved incision, involving a flap, may be made to expose the cranium. A chisel, drill, or trephine, large or small, may be used; if the opening be too small it can be enlarged with proper instruments. The dura may be simply punctured with the trocar or a dural flap may be made to expose the cerebral surface. This latter has the advantage of allowing of closer observation of the cortex and of finger exploration between cortex and dura.

The instrument to be used for the puncture is optional with the operator, and the depth to which it will be necessary to penetrate will depend on the amount of fluid in the ventricle.

Zenner used a trocar and found fluid at a depth of 1½ inches. Von Bergmann used a long exploring needle, and introduced it slowly until cerebro-spinal fluid escaped. Keen at first used a grooved director, but later a canula, No. 13, French, and thinks it less liable than any other instrument to do damage, which is principally the puncturing of larger vessels. Mayo Robson used a needle, and pushed it onward until fluid began to flow. Broca employed the trocar of a Potain aspirator, and came

upon fluid at the depth of 4 cm. Thiriar made use of a fine rubber canula, closed by a button, and penetrated to a depth of 5½ to 6 cm. I have in the one case used an aspirating needle; in the other, a fine trocar canula, No. 3, American. I have devised a canula with blunt stylet, which will be a useful instrument. In the one case I have penetrated to a depth of 2½ inches; in the other, 1½ inches, depending on the amount of distension of the ventricles.

Now, the very important question of drainage arises. Shall it be rapid and free, or slow and in drops, and shall there be irrigation? This question must be decided for the individual case, as the requirements for each must necessarily differ, depending on the conditions to be met.

If the effusion into the ventricle is the result of acute and still active inflammation, decompression by rapid removal of fluid and subsequent continuous drainage until the acute stage subsides, or repeated tappings, without drainage, would be the rational procedure. If the inflammation be in the stage of retrogression, the artificial removal of fluid by simply tapping, without drainage, will be all that is required.

In cerebellar, or tumors of other situations, blood clot from trauma, etc., compromising the circulation to the extent of bringing about hydrops ventriculi; if the condition be recent, rapid and continuous; if it be of longer duration, with great amount of fluid, where the brain tissue is or may be atrophied, tapping and slow continuous drainage, or repeated tapping would seem to be indicated. In chronic hydrocephalus, with great distention of the ventricles, the brain tissue being atrophied and greatly altered in physical relationship, in order to allow of gradual return to something approaching normal condition, it is best to both tap and drain slowly. That rapid emptying of the ventricles, under these circumstances, is dangerous and may be fatal is well illustrated by Keen's interesting and highly instructive Case No 2.

Finally, in abscess of brain breaking into the lateral ventricles the most rapid and free drainage and cleansing irrigations is the only procedure promising relief in that most dangerous condition. In these cases it would be best to trephine and drain both sides and irrigate from side to side. That this can be done is demonstrated by Keen's Case No. 1.

Repeated tappings or aspirations in some cases may advantageously take the place of drainage. The means to secure drainage will be found in the rubber tubes of different calibers, gauze, wicking, or horsehair.

In special cases operative procedure could go farther than puncture or drainage; the ventricles may be incised and opened with forceps so that a consistent mass (blood clot or foreign body) might be removed. In my second case a finger was introduced into the ventricle, without any apparent lasting detriment to the patient. Thus opening up the ventricle freely, probing and digital examination may be of diagnostic and therapeutic value in special instances.

Although it does not strictly come under the heading of this paper, mention is made of a number of cases of secondary spontaneous opening of the ventricle, from trauma or abscess, with drainage off of cerebro-spinal fluid, for a longer or a shorter time. Many of these have recovered; the condition did not add to the gravity of the disease or injury.

Indications.—What is generally understood as brain compression is the indication for trephining and tapping the ventricles of the brain. That compression can be a sole factor, without other important lesions, in producing death, is amply proven by the careful and interesting experiments upon animals, and remarkable results obtained by Dr. P. Deucher, published in the Deutsche Zeitschrift fur Chirurgie, Leipsig, 1892-'93, to which I would refer those interested.

It is true there is no certain method of differentiating compressing agents in the general cavity, the ventricles, or in both together. One such instance has come under my observation, the compressing fluid being drained from the general cavity. Opening of the dura would determine that; perhaps laminectomy, under the circumstances, would be of equal value with trephining.

The compression symptoms have so often been alluded to in the history of the operation that it will not be necessary to repeat them.

In the cases, so well described by Wernicke, of brain compression from simple or tubercular meningitis, decompression by tapping the ventricle offers reasonable hope of restoring brain function and maintaining its integrity. The symptomatology points to the fact that compression is often the sole element inducing a fatal termination. It is in these acute cases that the operation is of greatest value and urgently demanded.

When the skull has been opened for compression symptoms, which are confirmed by bulging of dura and protrusion of brain, no tumor, clot or depressed bone being found, it is indicated to tap the ventricles. This was shown in my Case No. 1, in that of Dr. Dugan, and that of Dr. Diller. These, although an unrelievable condition was found to be present, showed some amelioration of symptoms, as was well illustrated in Dr. Dugan's case.

Abscess of brain, which has invaded the ventricle, it is quite clear, demands immediate tapping and, if possible, irrigation from side to side. This needs no further elucidation or argument. Possible benefit may be received by tapping chronic hydrocephalus, where there is but little enlargement of head, and symptoms denoting a compression, moderate in extent and severity. This was well illustrated in Ayer's case, in which the compressing agent had been at play for over four years.

In tumors of the brain, involving the circulation to the extent of bringing about hydrops ventriculi, it is advisable to trephine and tap the ventricles, where the compressing agent adds to the suffering or disability of the patient or is a proximate cause of danger to life.

But in chronic hydrocephalus, with enlargement of head, with great distention of the ventricles and corresponding atrophy of brain tissue, it is contra-indicated to tap and drain. All cases of this class have died from the operation. One can easily comprehend that under these circumstances no benefit can accrue.

The following summary is offered in conclusion:

Trephining and tapping of the lateral ventricles of the brain:

(1) For distention of the ventricles, from acute simple or tubercular meningitis, is a therapeutic measure clearly indicated.

(2) For effusion of blood into the ventricles, from trauma or disease, makes recovery a possibility.

(3) For abscess, involving the ventricle, is immediately and imperatively demanded.

(4) For effusion into the ventricles from brain tumors, may afford relief to symptoms.

(5) For chronic hydrocephalus, moderate distention of the ventricles, without enlargement of head, may afford relief.

(6) For chronic hydrocephalus, great distention of ventricles, enlargement of head, will lead to a fatal result.

ESTUDIO CLÍNICO SOBRE LAS HERIDAS PENETRANTES DEL ABDOMEN.

Por el Dr. JUAN MANUEL ESCALONA.

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Entre los traumatismos que afectan de continuo la región abdominal tienen puesto preeminente las heridas, que, á cada paso, ocupan la atención del práctico, por la diversidad de hechos que entrañan y por la variedad de complicaciones con que se presentan, desde la herida que podemos llamar simple, hasta aquella que reviste una insólita gravedad, siendo necesariamente mortal. Soluciones de continuidad

amplias y que sólo comprometerían la vida por un proceso intercurrente ó mediato, como la infección *post lesionem*, ya por punible descuido del cirujano ó de sus ayudantes, ya por el enfermo mismo; soluciones de continuidad pequeñísimas y sinembargo de pronóstico funesto, por la lesión visceral que hayan producido.

En presencia de fenómenos tan complexos, de una sintomatología tan varia y diversamente apreciable, toca al clínico buscar una base sólida á su procedimiento y establecer un criterio quirúrgico que ordene é informe la conducta que ha de seguirse en todo caso, para llenar de cumplida manera su misión, y hermanar en un resultado satisfactorio las imposiciones del momento con los principios incontrovertibles de la ciencia.

Encargados durante algunos años de servicios quirúrgicos, ya en el hospital civil de hombres, y luego del servicio de "La Piedad" en el Hospital Vargas, y últimamente en el Hospital Militar del Distrito Federal, hemos tenido ocasión de recoger numerosas observaciones que dan luz á la materia de que nos ocupamos. También, después de la batalla reñida crúdamente entre los ejércitos de la usurpación y los de la revolución nacional, en el sitio de Boquerón, el 4 de octubre de 1892, fuimos enviados por el Ministerio de Guerra á prestar nuestros servicios á los heridos, fundando en el pueblo de los Teques un hospital de sangre, y allí acopiamos datos preciosos é importantes. Debemos, además, á la bondad de algunos de nuestros ilustrados colegas, y, en especial, del amigo y compañero Dr. F. A. Rísquez, varios casos personales de sus clínicas. Reciban, pues, aquí, la expresión sincera de nuestra gratitud.

Dejando á un lado la enojosa cuanto inútil división de las heridas del abdomen en punzantes, cortantes, contusas, etc., que no hacen sino trastornar la concepción clara y precisa de la lesión, sólo aceptaremos, clínicamente hablando, la división en:

Heridas no penetrantes, es decir: las que solo interesan la pared abdominal sin tocar al peritoneo.

Heridas penetrantes, las que alcanzan hasta la cavidad peritoneal.

Estas últimas son el objeto de nuestro estudio, que deseamos hubiera sido lo más completo posible, como un testimonio de alta estima y homenage de respecto á las celebridades médicas que toman asiento en este Congreso y una muestra de afección por la gran Nación Americana.

Entran en el plan de nuestro trabajo las subdivisiones que necesariamente hay que hacer de estas heridas en: (I) Con respecto á su causa, en: (*a*) Heridas por arma de fuego; (*b*) Heridas por arma blanca. (II) Con respecto á su efecto, en: (A) Heridas con lesiones viscerales; (B) Heridas sin lesión visceral.

Importante es esta subdivisión desde el punto de vista del diagnóstico, del pronóstico y del tratamiento, pues ella es la que regla la conducta del práctico en cada caso particular.

I.

(*a*) Heridas por Arma de Fuego. (*b*) Heridas por Arma Blanca.

(A) HERIDAS CON LESIONES VISCERALES.

Generalmente son estas las heridas que á cada momento encontramos, ya en los hospitales, ya en la práctica privada, y las que exigen más minucioso y atento examen.

Dada una herida del abdomen por arma de fuego ó por arma blanca, fuerza es plantar el problema siguiente: ¿Es una herida simple, es decir, sin lesión de una víscera, ó hay lesión visceral; cuál víscera ó cuáles ha interesado el proyectil ó el arma? La anatomía topográfica puede darnos razón, pero, si acaso, aproximada, no siempre verdadera, y no debemos por tanto atenernos á las deducciones que hayamos hecho; son sólo presunciones que en casos semejantes no tienen valor alguno, pues, con los movimientos del cuerpo en la lucha, por ejemplo, hay desalojamiento de los órganos abdominales; y el cuerpo vulnerante puede deslizarse sin herirlos.

Hay, pues, que tomar como base del diagnóstico los síntomas que suministra cada órgano en particular; es decir: en la herida de los intestinos la salida del gas que encierran y la distensión producida por él en la cavidad peritoneal, trayendo timpanismo, y la peritonitis subaguda, por el derrame de las materias intestinales en la misma cavidad peritoneal; una enterorragia abundante en la herida del intestino grueso; en la lesión de la vejiga ó del riñón la orina mezclada con sangre en proporción crecida. Por lo que toca á las heridas del hígado, del bazo, de un tronco ó rama arterial importantes son bastante oscuras pues no dan un síntoma inequívoco, etc.

De la compulsación de las estadísticas consultadas por mí y según las observaciones de Otis, Hoyne, MacCormac, Coley, Reclus, Packard, resulta que la generalidad de las heridas penetrantes del abdomen están complicadas con lesiones de las vísceras y entre estas, ocupan primer lugar los intestinos, por el hecho de llenar ellos la totalidad del vientre.

II.

(*a*) Heridas por Arma de Fuego. (*b*) Heridas por Arma Blanca.

(B) HERIDAS SIN LESIÓN VISCERAL.

Las heridas de este género, producidas por arma de fuego, ó por arma blanca, se caracterizan por la herida abdominal simple, sin lesión de vísceras ó interesando solo el peritoneo; pueden sí, acompañarse de hernia de vísceras intactas, intestinos, hígado, epiploon, etc. Nuevas ó funestas complicaciones, pues si la solución que da paso á un asa intestinal, es muy pequeña, es inevitable la estrangulación del intestino, por la irreductibilidad de la hernia.

Casi todos los autores convienen en la rareza de esta clase de heridas, correspondiendo su mayor número á las producidas por arma blanca. Sinembargo en 375 casos observados en el espacio de ocho años, hemos encontrado 56 sin lesión alguna de las vísceras.

La cuestión del diagnóstico en estas heridas es algo oscuro en las primeras horas, por la carencia de síntomas especiales.

El peritoneo es el solo interesado, ora permaneciendo en el interior de la cavidad abdominal, ó formando hernia al travez de la solución de continuidad.

La característica, pues, de las heridas penetrantes sin lesión de las vísceras, es la lesión del peritoneo, y sus caractéres son casi siempre idénticos, observándose diferencias, solo en ciertos signos dependientes de la causa productora de la lesión, bala ó arma blanca, que se distingue por la forma de los bordes, por la amplitud de la sección, por la diversa dirección de la trayectoria.

Conocida sobre manera, es hoy la sintomatología de las heridas penetrantes del abdomen, para que nos detengamos á exponerla; y en igual caso está lo que se relaciona con el valor de algunos síntomas, como el dolor, el vómito, las cámaras sanguinolentas, tenidos antes como patognomónicos, pero que nuevas y serias apreciaciones hacen reconocerlos, como inficles, inconstantes y equívocos. El dolor en multitud de casos de heridas simples es agudo, y se exacerba con la presión, y en heridas con lesión visceral no existe y si lo hay, es mínimo, y vice versa. El vómito bien puede presentarse como un simple fenómeno reflejo, en la vuelta del colapso producido por el temor, ó por una hemorragia abundante; y las cámaras sanguinolentas se presentan en la herida del intestino grueso, ó faltan, como faltan generalmente cuando los intestinos delgados han sido lesionados.

Esbozadas estas ideas generales, pasemos ahora á la parte esencial de nuestro trabajo, la que es móvil de que hayamos acojido la ocasión honrosa que nos brindó este augusto cuerpo; es decir, exponer nuestras ideas sobre el tratamiento de las heridas penetrantes del abdómen; ideas nacidas al calor de ese sentimiento de amor á la humanidad, que se anida en el corazón del médico, y que unido á la experiencia,

y al culto del saber, forma esa aureola de gloria que atrae la admiración, arranca aplausos, y levanta á los apóstoles de las ciencias médicas á las alturas de veneración y de la inmortalidad.

En las heridas simples, sin complicación ni de hernias de epiplón ó de vísceras, ni de peritonitis, ¿que tratamiento es el más apropiado y de resultados más satisfactorios?

¿En las heridas con lesión de las vísceras, manifestada esta por síntomas especiales, ó por una peritonitis subaguda, la intervencion quirúrgica debe ser precoz ó tardia?

Antes de asentar de modo definitivo, cual debe ser la conducta del cirujano, recordemos ligeramente un punto de alta importancia, y es la diversidad de opiniones, cuando se trata, no de una herida, en que los síntomas revelan una lesión visceral de trascendencia, no de una amplia herida simple que permite comprobar á la sola inspección ocular, su profundidad í carencia de complicación visceral, sino de una herida cuyo único carácter evidente es la penetración. Dividense, pues, las opiniones en este punto, pronunciándose unos por la abstención completa de toda intervención, y otros se deciden por la intervención inmediata. Luego expondremos nuestra manera de pensar en este punto.

Heridas sin lesión de vísceras.—Si el proyectil ha atravezado de parte á parte la cavidad abdominal, y el exámen minucioso y atento del enfermo nos revela un estado general relativamente satisfactorio, nuestra conducta es la oclusion completa de los orificios de entrada í salida de la bala y la inmovilidad absoluta del paciente. Si la bala se ha alojado en la cavidad abdominal, procedemos de idéntica manera sin preocuparnos por la permanencia del proyectil en el interior. Las razónes en que nos apoyamos son, primero: que la herida en todo su trayecto está completamente aséptica, merced á la alta temperatura del proyectil, y luego, la casi certeza de que no vendrá la peritonitis aguda, á complicar la lesión y á darle una gravedad insólita porque hay en la serosa peritoneal una especie de indiferentismo por las reacciones inflamatorias, cuando no son solicitadas por agentes sépticos exteriores ó interiores, y así hemos visto quedar en su cavidad, sangre que se ha reabsorvido sin producir fenómenos patológicos; el líquido de la ascitis, restos de soluciones con las que se han hecho lavados intraperitoneales. (Observaciones I, II, III, IV i V.)

Si la herida de que se trata es de arma blanca, amplia hasta permitir ver los órganos en toda su integridad, es de necesidad urgente practicar un lavado cuidadoso de la herida, hacer hasta donde sea posible el aseo riguroso del peritoneo, suturar profundamente para traer la reunión primitiva de los músculos seccionados í luego superficialmente, ocluyendo despues, con la cura de Lister toda la extensión lesionada. Estos cuidados son de urgencia, pues las heridas por arma blanca son generalmente sépticas. Agréguese á esto, la inmovilización del enfermo, las aplicaciones de hielo sobre el vientre y el uso al interior del opio unido á sustancias antisépticas.

Por lo que respecta al punto, en que hemos dicho hay opiniones opuestas: Cuando se trata de una herida cuya una característica es la penetración, resueltamente nos decidimos por la intervención inmediata, pues ¿no se estaria en presencia de una lesión visceral de trascendencia, que abandonada á si sola acarrearía la muerte? ¿No hemos visto una víscera herida, sin dar notaciones de la lesión que ha destruido su integridad anatómica ó funcional, y que solo revela más tarde la esplosión brusca de un proceso patológico que termina rápidamente con la muerte, ó que la autopsia pone de manifiesto? La única objeción que puede hacerse á la laparotomía exploradora es la de que no habiendo lesión alguna de importancia, se haya practicado una operación inútil, y aún en este caso, ¿es humanitario, es moral que el cirujano, niegue al pobre herido los recursos de la ciencia, y ahogue en una duda inconsciente el noble esfuerzo de su augusta misión? ¿A qué recursos habrá de ocurrir, cuando hecho impotente por el temor, una complicación mortal, le revele con toda la brutalidad de lo imprevisto, la verdad del proceso? La laparotomía entonces sería insuficiente para detener los estragos del mal, y la muerte aparecería entonces, ya que no á los ojos del hombre de ciencia, más sí, ante los del público como una consecuencia for-

zosa de la operación, y la propia honra, y la dignidad profesional, son vallas insalvables. Así, pues, cada vez que nos encontramos en presencia de una herida penetrante del abdómen, no vacilamos y practicamos sin pérdida de tiempo la laparotomía.

Heridas con lesión de las vísceras.—En estas lesiones, ya sean producidas por arma de fuego ó por arma blanca, la laparotomía se impone con lógica inflexible. Afirmación es esta que no admite discusión ni vasilaciones.

El solo punto cuestionable es, si debe practicarse la laparotomía inmediatamente, ó esperar á que se acentuen los síntomas que marcan la gravedad insólita de la lesión.

Por nuestra parte, haremos nuestra profesión de fé quirúrgica, si se nos permite la expresión, y daremos las razones en que nos apoyamos.

En toda herida penetrante del abdómen, con lesión visceral, aceptamos ó reconocemos, como único tratamiento racional y positivo, la intervención inmediata: la laparotomía franca, atrevida, sin vacilaciones ni pérdida de tiempo.

Veamos ahora las razones, para una afirmación tan rotunda, para una decisión tan absoluta.

¿Cual es el objeto primordial de una laparotomía? Ver, palpar la lesión producida en la víscera ó vísceras por el agente vulnerante, en primer lugar; y luego corregir los desperfectos ocasionados al órgano; impedir por medio de una *toilette* directa ó rigurosa, que los microorganismos ya entrados con el instrumento productor de la lesión, libren batalla para proclamarse vencedores sobre las ruinas de la célula ó sostener con el uso de antisépticos poderosos la vitalidad de esa misma célula para que reaccione favorablemente contra la infección. Un intestino ha sido abierto, ¿debemos esperar que todo su contenido se derrame en la cavidad peritoneal para intervenir?

Hay quienes proponen, esperar á que se presenten los signos precursores de la peritonitis, y ¿cuales serían esos signos precisos, claros, que nos marcasen la proximidad de una peritonitis? El dolor, los vómitos, los sudores, el meteorismo, el abultamiento y dureza del vientre, la macicez parcial ó general, ¿son signos precursores, ó signos que revelan la existencia del gran proceso inflamatorio, de la peritonitis misma? Esta proposición es ilusoria, y no pasa de ser una *charmante causerie.*

Otros opinan porque debe esperarse tambien para intervenir, que la peritonitis se establezca y llegue á su máximum de gravedad, basados en la esperanza de que el proceso inflamatorio se detenga y todo entre en su funcionamiento normal. Basta una rápida ojeada á la diversidad de lesiones puestas de manifiesto por la abertura del vientre, la série de manipulaciones necesarias para un trabajo de recomposición y reorganización completos, ó el tiempo necesario para todo esto, para desechar esta espectativa enojosa, para el cirujano y cruel para el enfermo. No hay en suma, laparotomía más difícil y de éxito más dudoso, que aquella que se practica en pleno proceso inflamatorio, que ha invadido por completo toda la cavidad abdominal. Intestinos distendidos, ligados entre sí por adherencias más ó menos fuertes, más ó menos extensas, que los retienen y dificultan su movilización, y hasta colecciones purulentas, que ocultan las perforaciones, colecciones generadoras de una infección general, que ha tenido y a como precursor, el escalofrio intenso y que testifica y da fé de su presencia la fiebre de alta temperatura y la postración del paciente, que se debate entre el dolor que le desgarra las entrañas y el delirio que le atormenta el cerebro y le arrebata la razón. Tal es el cuadro lúgubre que se presenta en esa hora suprema de la peritonitis sobre aguda y con que nos brindan los partidarios de la intervención tardía.

Como una razón más, en apoyo de nuestra decisión por la intervención inmediata, tenemos la bondad de nuestro clima, de una temperatura casi uniforme, sin oscilaciones bruscas de alza ó de descenso; el aire de nuestras ciudades, casi igual al de nuestros campos, con su oxígeno bienhechor, esparciendo vida á torrentes, proporcionado por nuestra lujuriante y fecunda vegetación, sin los elementos de viciación del aire europeo, por la carencia de hacinamiento de población. Esto es gran parte, para que

la generalidad de los trabajos quirúrgicos de nuestro país y particularmente las laparotomías sean coronadas frecuentemente por el éxito más completo, debiéndose las pérdidas, casi esclusivamente á las condiciones generales, ó mejor dicho, al estado orgánico y constitucional del individuo.

CONCLUSIONES.

(1) En toda herida penetrante simple del abdómen, perfectamente comprobada por un diagnóstico inequívoco, la regla es la abstención absoluta de toda exploración, y ocluir, con una cura antiséptica rigurosa el orificio, ó los orificios existentes.

(2) En toda herida simple penetrante del abdómen de amplia abertura (por arma blanca): lavado minucioso de todo el trayecto de la herida, suturas profundas y superficiales, según la profundidad de la herida y oclusión completa con cura antiséptica.

(3) En toda herida penetrante simple, con hernia visceral (hígado, intestino, epiploon): reducción de la hernia, hecha préviamente aséptica, y si la herida es muy péqueña y ha estrangulado la hernia, haciéndola irreducible, y provocando así daño para la víscera: laparotomía.

(4) En una herida abdominal, cuya única característica es la penetración, intervención inmediata: laparotomía explorada.

(5) En toda herida penetrante del abdómen con lesión visceral: intervención inmediata, laparotomía franca, sin vacilaciones.

OBSERVACIONES.

Personal.

Caso 1.—N. N., natural de Carácas, constitución robusta, de 23 años de edad, entró á mi servicio del Hospital Civil para hombres.

Al exámen, encontramos dos heridas penetrantes simples del abdómen, por arma de fuego (revolver, proyectil, 9 milímetros), los dos proyectiles estaban alojados en la cavidad peritoneal. Ausencia de todo síntoma que revelase la lesión de alguna víscera. Dolor circunscrito á los orificios de entrada situados: el uno á cinco centímetros por debajo del ombligo y tres centímetros á la izquierda de la línea media; el otro, á cinco y medio centímetros por delante y arriba de la espina ilíaca superior anterior.

Antisepsia de toda la pared exterior del vientre, oclusión de los orificios con colodión iodoformado, cura húmeda de Lister.

2° dia: Persistencia del dolor al nivel de los orificios. No hay reacción febril. Estado general, bien.

3er dia: Ligero meteorismo. Temperatura, 37.3°; pulso, 80. Dolor de igual intensidad.

4° dia· El meteorismo ha desaparecido. Dolor mucho menor. Temperatura, 37°; pulso, 76.

Desde este dia todo se normaliza í marcha bien, hasta el dia 12, que deja el hospital en completo estado de salud.

Caso 2.—N. N., italiano, de 40 años de edad, buhonero de profesión, alcohólico, entró á mi servicio del Hospital de Hombres, por una herida penetrante del abdómen por arma de fuego.

Al exámen, encontramos que la herida habia penetrado á cinco centímetros por encima de la sínfisis pubiana y un centímetro á la derecha de la línea media, saliendo el proyectil á medio centímetro de la apófisis trasversa de la 3ª vértebra lumbar, hacia la izquierda.

Ausencia de signos especiales á las lesiones viscerales.

Antisepsia de toda la región. Oclusión completa de los orificios de entrada í salida del proyectil. Cura húmeda de Lister.

Al dia siguiente el estado del herido es satisfactorio.

En los dias subsiguientes nada de anormal se presenta.

Al 8° dia se levanta el apósito, y se encuentran los orificios de salida, rasados, llenos de mamelones carnosos de rico aspecto. Se hace una nueva cura, seca.

Al 17° dia se levanta el apósito, y la cicatrización de los orificios es completa.

A los 20 dias, abandona el enfermo el hospital completamente bueno.

Por Dr. F. A. Rizquez.

Caso 3.—N. N., de 30 años de edad, natural de Carácas, fué herido por arma de fuego (revolver, calibre 9 milímetros).

La bala penetró en toda la región hipogástrica, quedándose alojada en la cavidad peritoneal.

Ausencia de síntomas que revelase la herida de algún órgano.

Cura oclusiva antiséptica rigurosa; espectación.

Cura sin complicaciones de ningún género á los 23 dias.

Hace hoy tres años del accidente y el estado de su salud es perfecto. De la bala, aún se ignora el sitio en que haya permanecido alojada, pues ningún síntoma, ni malestar lo determinan.

Caso 4.—Señor N. N., natural de Carácas, de 25 años de edad, fué herido con arma blanca.

El puñal penetró por debajo del reborde costal izquierdo.

Al exámen se comprobó: Una herida penetrante del abdómen con hérnia del epiplón.

Ausencia absoluta de síntomas que indicasen una herida del estómago.

Antisepsia del epiplón, reducción de este. Cura oclusiva.

Treinta horas despues, ligera inflamación peritoneal, circunscrita á los alrededores de la herida.

Al 4º dia, desaparición del ligero proceso inflamatorio.

Curación rápida, y completo restablecimiento de la salud á los diez y seis dias.

Personal.

Caso 5.—N. N., Canario, de 35 años de edad, jornalero, en una riña recibe una herida de arma blanca (cuchillo de zapatero).

Al exámen sé encontró una herida penetrante del abdómen, de siete centímetros de longitud, situada en la región epigástrica, como á cuatro centímetros distante, por encima, del ombligo, complicada con hernia del colon traverso. Fué visto por nosotros dos horas y media despues del accidente.

Asepsia del intestino y epiplón; gran lavado de toda la región y de la herida, reducción del colon; sutura profunda con catgut; sutura superficial. Cura oclusiva. Opio al interior y aplicaciones de hielo al exterior.

Peritonitis localizada al rededor de la herida, sin tomar proporciones agudas.

Al 5º dia aún quedan vestigios de la inflamacion peritoneal.

Al 10º dia las funciones intestinales se normalizan. El orden fisiológico, comienza á recobrar su imperio, y la curación es completa sin otra complicación á los 28 dias.

PRACTICAL POINTS IN THE TREATMENT OF HIP DISEASE.

By A. D. JUDSON, M. D.

Orthopedic surgeon to the out-patient department of the New York Hospital.

Hip disease may be called a semimalignant affection because of its duration and its destructive quality. But it is almost never fatal. In every large community there are many healthy and active adults, who bear traces of this disease in scars and deformity, many of them never having had adequate treatment. In all stages of the disease it may be predicted, excepting in patients who are exceptionally unfortunate in their surroundings, that the time will come when the forces of nature will rally and repair take the place of disintegration.

In approaching the subject of treatment it is necessary to bear in mind that the destructiveness and inveteracy of this disease are largely the result of mechanical environment. Its full counterpart in the upper extremity is not found, evidently because in the upper extremity the focus ignited in the cancellous tissue is, as a rule, resolved at an early stage by reason of the exemption of the upper extremities from the labors and hardships attending locomotion. We can not do better, therefore, than to nullify pernicious mechanical environment. By so doing we directly banish trauma from the part affected and indirectly fortify the general health and in both ways invite the advent of the "natural cure."

The three cases which are to be cited illustrated the good effect of mechanical treatment in the most unpromising cases.

Case 1.—A boy, 6 years of age, presented an enormous abscess and all the usual symptoms of the last stage of the disease, which had continued in the right hip for nineteen months. Exsection of the joint had been urged by a surgical attendant. The abscess opened spontaneously on the first day the patient was seen and before treatment could be begun. The child's general condition was bad. The limb was greatly adducted and flexed, and the slightest disturbance of the joint elicited screams of pain. Mechanical treatment was begun the sixth day after the patient was first examined. Pain was relieved at once. He was enabled to be out of bed without delay and out of the house nearly every day throughout the entire course of treatment which lasted two and a half years. The affected joint received the benefit of fixation, or a reasonable degree of immobilization, and was thoroughly protected from the traumatic incidents of locomotion. The adduction of the limb gradually and painlessly disappeared as the boy made use of the limb protected by the splint in walking and flexion was reduced till the limb was in a position favorable for locomotion. Wearing the splint, the patient pursued the ordinary occupations of a boy of his age, while the reparative process supplanted the ravages of disease.

The abscess, already referred to, was followed at irregular intervals by other purulent collections which were incised or allowed to open spontaneously. At one time there were nine sinuses about the joint, all derived from diseased bone. Five of these extended in a line down the outer side of the thigh from the trochanter to near the middle of the shaft of the femur, as seen in fig. 1. The position of these sinuses, from one of which a sequestrum was extruded, and the attachment of the resulting cicatrices to the bone showed the shaft of the femur was to a great extent involved in the destructive process. The patient's condition six months after the cessation of treatment is shown in figs. 1 and 2. The limb is in good position, neither abducted nor adducted, and flexed at a slight angle, enough to allow him to sit comfortably and yet not enough to interfere with graceful locomotion. He walks with firmness, runs fast, and never uses a cane. There is practically no apparent shortening; that is, the shortening due to adduction and flexion. The "real" shortening is 1 inch, due partly to changes in the femoral head and neck, but more to the fact that the skeleton of the affected limb is smaller than that of the well limb. This difference is seen in the difference between the outlines of the feet, as shown in fig. 3, and is also due partly to the fact that the growth of the affected limb has been retarded by disease while the development of the well limb has been forced by overexertion for so long a period. The position of the sinuses is shown in the figures. The scars are depressed and attached to the deep fasciæ and bone. They are numbered in the order in which the sinuses appeared. Figs. 1, 2, 4, 5, 7, and 8 are copied from photographs.

Case 2.—A girl, 3 years of age, had a family history in which the mother, the maternal grandmother, and three paternal uncles and aunts had died of pulmonary tuberculosis. (The family histories in cases 1 and 3 were remarkably free from similar incidents.) The disease had been present in the right hip a year or more. Treatment had been by the immovable plaster of paris dressing, the wheel-crutch, and by portative apparatus in which there was provision for motion at the knee but not for traction. When first seen the child presented the marked adduction and flexion characteristic of an advanced stage. She had suffered for several weeks the severe pain which forbodes an abscess, and is due probably to the retention of pus in the cancellous tissue of the bone. Soon after the application of mechanical treatment the position of the limb improved, adduction giving place to abduction, and flexion being materially reduced. The pain ceased as the result perhaps of the escape of pus from the hard shell inclosing the cancellous tissue. Five months after treatment began the pus was released from the soft parts by incision, and in the following eighteen months five other sinuses were established spontaneously or by incision. Their location and order are indicated in figs. 4 and 5 which show the child's condition eight months after the cessation of treatment. The scars are attached to periosteum and deep fasciae. Her health is perfect and she walks and runs without assistance of any kind. The position of the femur is favorable both for walking and sitting, there being no abduction or adduction, and but a moderate degree of flexion. The real shortening is only one-fourth of an inch. The outlines of her feet is shown in fig. 6. When she walks with care it is difficult to perceive any defect although the motion in the joint itself is so slight as to be of very little use in locomotion, advantage being unconsciously taken of the flexibility of the lumbar region of the spine and of the unimpaired mobility of the sound hip-joint. Fast walking and running develop a limp but not enough to exclude her from the ordinary pastimes of youth.

Case 3.—A boy of 7 years had suffered from disease of the right hip for four years. His father was a dealer in surgical instruments, and the boy had worn elaborate

appliances, the chief defect of which had been in the slight construction of the frame of the portative splints which had failed to make sufficient traction or to relieve the affected joint from the weight of the body in standing and walking. The usual signs of an advanced stage were present, and an abscess was pointing when treatment commenced. Improvement in the position of the limb was soon seen. In course of time four sinuses were established either spontaneously or by incision as seemed to be necessary. The case progressed favorably and the duration of treatment was four and a half years, longer than was necessary through excess of caution and anxiety on the part of the father. Figs. 7 and 8 show the boy's condition eighteen months after all treatment was discontinued. Scars 2 and 4 are attached to the underlying bone. He takes long walks to and from school, is a good skater, and walks and runs with great speed although motion in the joint is practically wanting. He never uses a cane. When walking carefully, there is no defect in his gait. There is one-half inch of real shortening. The outlines of his feet are shown in fig. 9. The position of the limb is good, there being a moderate degree of flexion, enough to facilitate sitting, but not enough to interfere with graceful locomotion. There is neither abduction nor adduction.

Since these cases were reported the patients have retained their health and activity, but two of them have lost some of the symmetry above noted. The femur became flexed and adducted, not enough to compromise ability in locomotion, but yet enough to give a defect to the gait. This is evidently the result of a failure to retain the prescribed natural rhythm of walking. The third patient, becoming a medical student, understood and appreciated the importance of rhythmical locomotion, and retains the symmetry recorded.

These cases are not presented to illustrate the achievements of mechanical treatment in early and promising cases, but to show what should be the result in cases of the worst kind taken in advanced stages, provided the assistance of intelligent and thrifty parents is assured. In favorable circumstances and with treatment begun at the earliest sign of a focus, the result should be, and sometimes is, such as to make it difficult by careful examination and measurement to discover any asymmetry or trace of disability.

The same general rules or principles of treatment hold good in the earliest stage and in the most desperate and advanced stages. Treatment should make sure of four things: (1) Preservation of the general health throughout the treatment; (2) the arrest of motion in the joint in the acute stage; (3) the removal of the weight of the body from the joint in all stages; and (4) provision for final symmetry and locomotor ability.

The first consideration is the general health of the patient. On this we rely, in the absence of specific medication and established operative procedures, for the natural return of the affected part from progressive destruction to progressive repair. Can a patient thus beset be better off than when equipped so that he can rise from his bed after a painless sleep and pass the day up and dressed, and with his schoolmates and playfellows, his appetite and respiration stimulated by happy hours passed in the fresh air and sunshine? With suitable mechanical equipment the patient should not, and will not if left to himself, pass an hour of his waking time in the invalid's bed.

Second, the arrest of motion in the joint may be amply secured by the traction exerted by the hip splint in those stages in which it is required by the painful condition of the joint and the apprehension which the very thought of articular disturbance excites in the mind of the patient. Absolute immobilization is out of the question from the mechanism of the hip-joint, but fixation, or a reasonable degree of immobilization, is easily produced and conveniently maintained.

Third, the patient equipped with the hip splint when standing and walking is prevented from putting his weight on the joint. The heel can not reach the ground. The patient sits on the perineal strap of the apparatus, which is essentially a crutch head applied to the ischiatic instead of the axillary region. With this arrangement he wears a high sole on the well foot to make up for the factitious length which is given by the splint to the affected side. It is not entirely fanciful to say that the patient is sitting while walking, because he alternately stands on the well foot and sits on the perineal strap. An adult patient tells me that when tired he rests while

still erect, by leaning against some support and sitting on the hip splint. It was thought at one time that it was impossible for a patient to go for any time touching the ground with only one foot. With the hip splint, however, children run about for years, putting their weight on the well limb alone, the affected leg being thus converted into a pendent member, like the arm. The result is immediate relief from urgent symptoms and the promotion of recovery.

Fourth, the patient while wearing the hip splint may be induced by instruction and drill to give up the "false time" of his footsteps, which is the chief cause of the deformity and limp of hip disease, and to return to the natural rhythm of human locomotion, in which equal time is given to the two feet. The result of walking habitually in this way is at once the abolition of a great deal of the appearance of lameness and in time the correction of deformity, because the adducted limb will pass, without conscious effort on the part of the patient, from adduction to abduction (with, at the same time, and for the same reason, a decrease in flexion), in order to place itself in that position in which it can best do its half of the work of progression, thrown upon it by the adoption, or rather the resumption, of natural rhythm or "correct time" in walking.

A few words are in place describing the apparatus and its application. Its frame is made of steel. In use it does not require to be bent, as so many pieces of orthopedic apparatus do; therefore it may be well, but not too sharply, tempered. It consists of upright and pelvic band, as shown in fig. 10. The upright, shown in fig. 11, extends from the ground to a point about midway between the iliac crest and the trochanter. It is flat, with its width laterally disposed, and its thickness anteroposteriorly, an arrangement by which the strength of the metal is in the direction of the strain when the patient's weight is borne by the instrument. It is composed of a bar and a box, the former being propelled in the latter by a rack and pinion, and held at the point of election by suitable mechanism. The box is attached above to the pelvic band and the bar ends below in the footpiece, which is shod with leather and carries two leather straps. A high sole for the well side is conveniently carved from a block of light wood and fastened to the sole of the shoe in the manner shown in fig. 12. Properly shaped and stained it is quite as presentable as the more expensive cork sole. A kneepiece is adjustable on the upright, and, being of soft steel, is easily adapted to the size of the lower part of the thigh.

If the patient is tall and requires a longer upright, this piece is carried on the bar, instead of, as in figs. 10 and 11, on the box, thus doing away with the necessity of increasing the length of the latter with the increased length of the upright. A piece of webbing is buckled around the upright and the limb at the lower part of the thigh, and a leather strap around the upright and the lower part of the leg. The pelvic band, shown in figs. 10 and 13, is a nearly semicircular piece of bar steel, covered with leather, or better with hard rubber, the angle of its attachment to the upright being adjustable and firmly fixed by a bolt and nut. It carries the perineal strap of webbing padded with blanketing and covered with Canton flannel. A strip of adhesive plaster from 1¼ to 3 inches wide and ending below in a buckle extends on each side of the limb from the middle of the thigh to the lower part of the leg. The plaster is protected by a legging made of twilled muslin provided with eyelets for lacing.

To apply traction to the limb, the leather straps attached to the foot piece are buckled to the adhesive-plaster strips attached to the limb, the perineal strap is buttoned over the ends of the pelvic band, and the rack is propelled in the direction of the foot by the pinion or key. In practice, if the patient is more than a mere child, he uses the key at will, and may be depended on, if the joint is in a painful or tender condition, to keep up steady traction as long as there is any indication for its use. It was thought at first that traction thus applied relieved pressure on painful articular surfaces, but there is excellent reason to believe that its good effect is due to the fact that it assists the patient in his conscious and unconscious (voluntary and reflex) efforts to keep the joint from motion; in other words, that it produces fixation, or a reasonable degree of immobilization. The knee piece is useful in the same way. Worn at the lower part of the shaft of the femur it hinders motion at the knee and, *pari passu*, at the hip. There is probably no more distressing sight

than that of a patient in the acute stage of hip disease, and no resort of surgery is more simple in *modus operandi* and more certain to give relief than the application of traction in this way. It is not to be overlooked that traction thus applied secures whatever benefit may accrue from the counteraction of the circumarticular muscles.

In this stage the apparatus should be applied, although abscesses and great deformity are present, as in the exceptionally difficult cases related above. The end of the pelvic band may extend obliquely over the chest on account of the adduction of the limb. It may even be necessary at the beginning to attach the perineal strap by buckles instead of loops, to gain for it a suitable length, and in some cases to apply it to the perineum on the sound side. But with care and gentleness the apparatus can be arranged in some way so that a slight and increasing amount of traction is effected. Immediate relief from pain is followed soon by reduction of the deformity, so that in a few days the restored symmetry of the patient's figure will enable him to wear the splint properly adjusted and comfortably. The pelvic band may then be brought down to its proper place on a level midway between the anterior superior spine of the ilium and the pubic bone. It may thereafter be kept at that level if the perineal strap is of the right length and suspended by loops instead of buckles. A bedridden patient treated in this way soon recovers strength from the return of sound sleep and before long seeks to leave his bed and try walking without crutch support except that afforded by the perineal strap. A high sole is attached to the shoe of the well foot, and a shoulder strap, shown in fig. 13, transfers the weight of the splint to the opposite shoulder, and he is instructed in the necessity of acquiring, as soon as it can be done by daily effort, the habit of moving his feet in correct time. He then ceases to be seen at his home or in the hospital ward, and becomes an "office patient" or "out patient."

The splint as thus far described is to be worn day and night. It makes traction on the limb and protects the joint from the traumatisms of walking. The latter is necessary in all stages of the disease, but there are long periods when traction is not necessary, when all that the patient requires is a perineal or ischiatic support to keep the affected limb from reaching the ground. The adhesive plasters and the rack and pinion and other machinery for maintaining traction may therefore be dispensed with during a large part of the treatment. The simple upright shown in fig. 13 may then be used instead of the upright shown in figs. 10 and 11. Alteration in the length of this upright and adjustment of the knee piece are provided for in a simple manner. The adhesive plasters are removed from the limb and the leather straps from the foot piece, but in all other respects the apparatus is applied and worn as if it were a traction splint. Thus simplified, however, it is essentially an ischiatic crutch, and, like any other crutch, it is to be laid aside at night.

In closing, it may be said that the apparatus thus arranged as a crutch may be useful in many other affections besides hip disease. If its simplicity and convenience were generally recognized, it might facilitate the treatment of any disease or injury of the lower extremity in which it is desirable to let the patient take exercise without using the affected limb.

EPITHELIOMA OF THE TONGUE AND ITS TREATMENT.

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If the literature of the lingual neoplasm be studied, it is found that the chapter consecrated to malignant genus has been gradually undergoing change. Formerly, writers recognized here the existence of four species—viz, scirrhous, encephaloid,

melanotic, and cancroid or epithelioma; to-day, by most writers the generic tree is stripped of three of its branches and there remains only epithelioma as the sole type of malignant growth appearing in the tongue; although a few authorities contend that both epithelioma and carcinoma may appear in the tongue, yet Paget, Hutchinson, Thiersch, Billroth, and Otto Weber find epithelioma to be the only form of malignant tumor that attacks the tongue; and these authorities claim that the only cases they have seen where carcinoma was present, were those in which the disease had reached the tongue secondarily after having commenced primarily in contiguous structures.

Pathologists teach that the constituent element of the epithelioma is the epithelial element disposed in horizontal or concentric layers superposed on each other; and such cells, even in stratified arrangement, are sometimes found deep beneath the surface, so deep, indeed, that Weber claims they have arisen from connective tissue elements; Thiersch admits the same, although unwillingly, his theory allowing of the origin of epitheliomatous cells only from preexistent epithelial cells.

Epithelial cancer, according to its site or to its situation in respect to the surface of the tongue, may be divided into two classes, viz, the excrescent and the internal or interstitial, and each of these may arise from a papilla, wart, naevus, or from a limited abrasion, which may be a crack, a fissure, or a plane erosion; and these initial points of commencement, if examined early, have no characteristics of epithelioma.

If the unaffected lingual papilla be examined histologically, it is found that the cells which invest it have an arrangement similar to that possessed by all other normal papillæ, but when the epitheliomatous change occurs then the papillæ become radically altered in their form, in fact, they become crowded out of existence by the invading strata or lines of multiplying epithelial cells.

In the excrescent or papillary species the growth is outwards rather than inwards; tuberculated, crested or wart-like prominences isolated or forced into an uplifted plateau, stand on a hardened base.

In the internal form there is, besides growth outwards, especially a development inwards of epithelioid calls which penetrate between the muscular fibers and along the tissue which incloses the vessel and nerves. The invading new-formed elements crowd on and destroy the muscular tissue, the walls of the lymphatics, and of the blood vessels. The cells in this deeper situation are more permanent than those which develop at the surface; the latter, by their remoteness from vascular supply, and especially by their exposed situation, are being constantly detached and thus the uplifted structure presents a raw surface. This eccentric or superficial growth may be sessile or pedunculated, and often rises into crests resembling the cock's comb. It is situated usually on the dorsal or anterior face of the tongue, and less often near the epiglottis. The tumor may also be mulberry-like in form, with reddish tint and bleeding when touched. The lingual epithelioma of surperficial site occasionally attains proportions too immense to be retained in the buccal cavity.

The penetrating species commences, according to the author's observation, most usually on the side of the base of the tongue near one of the ends of the V, which the calyciform glands there form, or, more definitely located, it begins in the sulcus between the base of the tongue and the palato-glossus muscle, and thence extends upward on the base of the tongue, as well as laterally on the wall of the pharynx. This small ulcer ever rests on a hard base, and it is bounded by irregularly notched or jagged edges, which, from being undermined, sink and become infolded. If this ulcerated structure be compressed between the fingers, thereby whitish or grayish vermiform bodies are forced out, and these, examined microscopically, are seen to be a conglomerate of epithelial cells.

The ulcerating process is unilateral and it rarely crosses the fibrous median septum of the tongue; when situated posteriorly, it finally, in its lateral extension, attacks the alveolar process of the lower jaw.

Instead of this posterior site, it may appear on the free border of the tongue anteriorly and at or near the tip of the organ. In two cases the writer saw the epithelioma on the free border midway between the base and the tip of the tongue, while in a third case the disease occupied the anterior border of the tongue and extended backwards along the border equally on each side for a distance of a half inch from the median line.

Both in the deep and in the excrescent form the ulcerative process finally reaches and opens blood vessels, and thus hemorrhage, slight or profuse, occurs and weakens the patient. The taking of food into the mouth and its mastication is the source of so much pain that the patient voluntarily abstains from food, and from this cause he emaciates and loses strength. The decaying, ichorous, feted materials, which are generated and detached from the ulcerating surface, are partly swallowed, or they pass through the windpipe to the lungs. In the former case the material, being absorbed, vitiates the blood; in the lungs such material is not only absorbed into the circulation, but it also acts locally on the pulmonary structure causing an adynamic pneumonia.

The morbid agencies just enumerated are reinforced after some months by the appearance of the disease in the lymphatic glands, and this metastatic development corresponds, as a rule, to the affected side of the tongue; it is only exceptional that the metastasis appears on the opposite side. The infected gland or glands, though swollen, are for some time very movable; later they become adherent to the adjacent tissues, and finally to the overlying skin, so that the whole is a conglomerated mass of heterogeneous structures, in which glands, muscles, vessels, nerves, are almost indistinguishably fused together. The glands initially infected are those which lie internal to the angle of the lower jaw, and just behind or below the submaxillary salivary gland. Later this fused conglomerated structure becomes very closely adherent to the skin, which is thickened and often presents one or more folds with intervening depressions.

There is but little pain in this morbid mass of secondary infection. The swollen glands are painless, and this painlessness is a cause that the attention of neither physician nor patient is drawn to these glands until their presence is plainly disclosed by visible swelling. But as the treatment and prognosis of lingual epithelioma are intimately connected with the condition of these glands they should be carefully examined; this examination should be one of skilled tact and care, and should be made at an early stage of the disease; by placing one finger on the outside of the lower jaw and another on the inside the structures of the floor of the mouth are included and may be exp'ored; the region around the submaxillary gland should especially be examined; thus an indurated gland, if present, can be discovered, and, if there be doubt, the normal condition of the opposite side will serve for corrective decision.

The mass of agglutinated tissues continuing to enlarge, the central portion afterwards commences to soften, and finally the skin opens and an ichorous fluid containing cheesy fragments is discharged. At first this opening is a small orifice, but it continues to enlarge until it becomes a free, crater-like outlet, which ever enlarges without any sign of healing. Should this mass be removed before it opens, there will be found in it a central cavity containing softening material; the outlines of the cavity are irregularly notched, jagged, and of a dark, livid color. When such cavity is, however, allowed to open, although it freely discharges the breaking-down material, yet this has no limiting effect on the progress of the disease; the conglomerated mass continually incorporates into itself other tissues which are adjacent to it; it passes from the side originally invaded to the other, and finally the front upper portion of the neck is involved; in this enlarged field other openings may form.

Another form of metastatic invasion of the structures of the floor of the mouth and of the upper part of the neck, has been seen; in this there is little or no dispo-

sition to suppuration; there is swelling and rapid infiltration of the parts mentioned; the skin remains white, and the affection has no definite bounds. It is accompanied by an oedema of the base of tongue and entrance of the larynx; the oedematous swelling may quickly cause death by occluding the glottis. The case here is allied to the purulent oedema described by Pirogoff, since, if after death, these affected tissues be opened with the knife, there escapes a sero-purulent fluid with which the swollen structures are saturated.

The course and duration of lingual cancer, when allowed to run its natural course, will, according to Demarguay, complete its fatal work within fourteen months; and this short period, he says, may yet be abbreviated if the disease be unwisely attacked. The history of operative interference, as usually found in surgical works, does not offer an encouraging prospect for the patient, as nearly all authorities report recurrence after operation. One writer, however, Otto Yust, presents figures much more favorable; he states that recurrence takes place in only twenty-five per cent of the cases. The writer of this article fully shares the opinion of Yust, and further believes that even more than 75 per cent of patients could be saved if the disease were seen in its primary stage and treated then by intelligent surgery.

Meddlesome ignorance too often monopolizes the precious weeks, when proper treatment might rescue the patient from death. Intelligent management can prolong life although the disease be not cured, for after operation the average duration of life has been two years. The absence of glandular metastatic infection adds much to the prospect of nonrecurrence; in fact, it may be regarded as almost a guaranty against return.

In case of relapse the epithelioma commonly reappears at or near its primary site; or, it may appear in the subjacent glands. It has been observed that when the disease recurs, it grows at a far more rapid rate than it did prior to the operation.

The causation of epithelial cancer of the tongue is unknown; it is evident, however, that certain agencies do promote its evolution; as such may be cited, calcereous incrustations on the inner face of the teeth, sharp points or edges of the teeth which may continually wound the borders of the tongue, the habit of thrusting the tongue into an interstice between teeth, or into the hollow of a decayed tooth. The use of tobacco is, probably, a casual agency, and this explains the far greater frequency of the disease in men than in women, who seldom use tobacco. That the man is often less attentive to the cleanliness of his mouth than the woman, predisposes the former to epitheliomatous affection, not alone of the tongue, but of the entire walls of the buccal cavity.

Age has an important bearing in the development of the tongue; epithelioma here seldom appears under 40 years of age; it oftenest occurs between 40 and 70 years of age; yet there may be exceptions to this, since Billroth saw the disease in a youth 18 years of age.

DIAGNOSIS.

The diagnosis of lingual epithelioma is of the utmost importance. One unfortunate error which has sometimes been made is that of confounding syphilitic affection with cancerous disease of the tongue; to avoid such misapprehension the surgeon should have in his mind a definite picture of the manner in which syphillis affects the tongue.

Syphilis may appear as the primary chancre on the tongue, and then the appearances are similar to those of the disease when seated on the mucous membrane of the lips, and, to test the matter, if the chancrous lingual ulcer be cauterized and touched with a mild astringent, the ulcer will heal; but if it be cancerous such mild local treatment will fail to heal the lesion. A primary syphilitic sore may heal spontaneously, the epithelial ulcer grows larger instead of less.

The secondary manifestations of syphilis, according to one of the most competent

authorities, Fournier, may present themselves in one of the following forms: (1) Ulcerating syphilide or eruption; (2) nonulcerating gummy eruption, and gummy growth within the tongue.

(1) The ulcerating eruptions are small lenticular ulcers which are round when seated on the dorsal surface, but when on the sides they are more angular in shape. They appear in solitary or in crecentic groups, are indurated and chronic in duration, and when touched, or if the tongue be moved, they are painful.

(2) Nonulcerating syphilitic eruption of the tongue, named, also, lingual sclerosis, or plastic glossitis, presents itself in the form of round and irregularly shapen nodules, which are situated in the surface of the tongue and rise somewhat above it; the overlying mucous membrane is redder and smoother than normal, and it appears thickened and as if the papillæ had been removed from it. The entire surface of the tongue may be the site of such syphilides, and then the teeth make impressions on the side of the tongue.

(3) Gumma (better gummi) may develop in the mucous membrane of the tongue or in the muscular tissue of the organ. Gumma lies in or near the dorsum of the tongue, and should it commence deeper it then grows toward the dorsal surface. There are usually from one to four gummatous tumors in the tongue, and they may be small, or so large as to protrude the tongue from the mouth. When in the mucous membrane it is diminutive, but when in the muscular tissue it may attain the dimensions of a walnut. Such gummatous growth may ulcerate and present a hollow cavity filled with gangrenous structure, and for years this may remain open. Unless it opens, the lingual gumma is painless, but when it opens, speaking, chewing, swallowing, and other acts in which the tongue is concerned, are interfered with and there is consequent pain. The saliva is increased in quantity and the breath becomes fetid; taste is unimpaired and the glands rarely swell.

This is Fournier's description of the syphilitic eruptions of the tongue, which he says may be confounded with lingual cancer; the latter, however, appears in the old, while syphilitic eruptions appear oftener in the young and robust subject. Cancer may be inherited, which is rarely the case with lingual syphilitic manifestations. Cancer remains a tumor, although it be ulcerated in its surface, and its base has a better defined induration than is the case with the ulcerated gummy tumor. Cancer appears on one side, while syphilis is bilateral in its development. Lingual cancer is more spongy than the syphilitic growth, the former is inclined to bleed, while the gummy growth is not. Cancer has less steep edges than a gummy ulcer; the former granulates less, is not so covered with gangrenous tissue, and it has a more fetid odor than the gummy ulcer. In the advanced period of lingual cancer the adjacent glands become implicated; this is rarely the case in gummy ulcer. The writer will add that it is rare that secondary syphilis has so isolated a location as the tongue; if found there, it should also manifest itself elsewhere.

Langenbeck, in 1881, gave the following differentiating mark between syphilitic gumma and lingual cancer. Gumma presents one or more rounded, flattened tumors, on which the mucous membrane appears smooth and shining, and the remaining mucous membrane presents a warty, fissured aspect. Gumma appears in the muscular structure of the tongue, and never in the submucous tissue of the floor of the mouth. Multiple tumors indicate syphilitic disease. Cancerous disease is more painful and it bleeds easily. It soon passes to the floor of the mouth, where gumma does not appear. Langenbeck observed cases in which neglected syphilitic disease of the tongue became cancerous.

Demarguay observes that gummy tumor of the tongue is at first round and hard, and later this softens in the center; conditions not found in cancerous disease.

Boyer states that cancer attacks by preference the sides and point of the tongue, while syphilis appears oftenest in the median part and on the base of the tongue.

TREATMENT.

Epithelial cancer in its commencement is a purely local disease, and at this stage it is curable by appropriate treatment; but if the disease be allowed to progress and attack the greater portion of the organ, and, especially, if the glands beneath the floor of the mouth have become infected, then treatment will aim rather at palliation than at eradication of the disease. Where the disease already occupies all of the tongue, or its greater part, noninterference should be the guiding rule; in such state the surgeon's hand by attempting to remove the disease would only stir the fire and widen the area of the flames. But in all cases in which the disease is circumscribed to a portion of the tongue that can be so operated on that the track of extirpation will be wholly within the sound tissues, then an operation may be resorted to, with strong probability of curing the patient.

Three different routes have been recommended for operative procedures upon the tongue, namely: through the floor of the mouth, through the mouth itself, and thirdly, through the lower part of the cheek. Numerous methods in the work of extirpation have been proposed and followed. Though multifarious, these may be placed in the following classes: Cauterization, potential and actual; ligation, immediate or gradual; excision, by knife, scissors, écraseur, or by thermal cautery. One or more of these methods finds illustration in the work that has been done by eminent surgeons whose procedures in somewhat chronological order here follow:

In 1842, Regnoli, to remove the tongue, made an incision from the os hyoides to the symphysis of the chin, and then made a second incision along the inner border of the inferior maxillary arch; then through the two flapped openings thus made, the tongue was drawn down and excised. In this way he removed the tongue of a girl who recovered so well from the operation that she spoke clearly and distinctly.

In 1850, Nélaton found that division of the lower jaw through the symphysis was an important aid in the operation of excising the tongue; the jaw was divided by means of a chain saw, and after the removal of the tongue he reunited the halves of the jaw by means of a ligature which included the front teeth on each side; the incisors and canine teeth were tied. Sedilot, in a comparison of Nélaton's plan with that of Regnoli, prefers the former since it renders more of the tongue accessible to the operator; he thinks, however, that mere fixation of the sides by dental ligation is an imperfect plan; and, to more securely fix the parts, he would so saw the sides that one end would have a solid angle which might be received in a hollow angle in the other end.

Near the same period Syme operated in somewhat the same manner as Nélaton; viz, he divided the lower jaw through the symphysis, and English writers name this method as that of Syme.

In 1858, Demarquay operated in the following manner: A vertical incision was made through the lower lip when the lower jaw was divided in the median line with the chain saw; the tongue was excised with the écraseur, and the divided bones reunited by means of a gutta-percha appliance; a complete recovery was thus obtained.

Thiersch, in 1865, wrote on lingual epithelioma, and finds that it commences oftener on the edges of the tongue than elsewhere.

Since the disease advances insidiously, undermining parts that are sound, he prefers to do the work of removal with the knife rather than with the thermal cautery or the écraseur. As a preliminary to the removal, he ties the lingual artery, which he ligates near the os hyoides, of which the corner should be fixed with a tenaculum. In one case Thiersch tied the right and left lingual arteries, and in another case, not finding the lingual, he ligated the common carotid artery.

Nunneley, an English writer, in 1866, from his experience in five cases of cancer of the tongue, pronounces the operation of removing the organ to be void of peril. In three of his cases the disease did not return. He removed with the écraseur. To do

this Nunneley first thrust a curved needle between the hyoid bone and the lower jaw, letting it emerge under the tongue near the frænum. By this means the écraseur was drawn into the mouth and over and behind the root of the tongue. To aid in applying the écraseur the tongue must be drawn well out of the mouth. The division of the parts must be done slowly, so as to insure the closure of the vessels.

Paget, to remove the tongue, first divides the genio-hyoid muscles near their insertion in the inferior maxilla. Through the opening made the tongue is drawn down, and then, an incision being made around the tongue through the mucous membrane, the loop of the écraseur is placed in this cut, and the division of the organ may now be made.

Buchanan, as preparatory step, first divided the lower jaw in the symphysis, according to the plan of Nélaton and Syme, and then through this opening he removed the tongue.

Gamgee, in 1868, removed the tongue by Regnoli's method, in which he separated the muscles from the lower jaw on both sides as far back as the facial arteries; he is undecided whether this plan is better than that of Syme, in which, as preliminary step, the jaw is severed at the symphysis. He favors the previous ligation of the lingual arteries.

In 1868, Podrazky, of Vienna, reported the extirpation of the tongue for epithelioma, in which as preparatory step he tied both the lingual arteries; and he claims that this was the first time that simultaneous ligation of these vessels has been done.

In 1871, Harrison, an English surgeon, to excise the tongue affected with cancer, first divides the frænum and the mucous membrane around the tongue so that the organ can be drawn well forward. Through the sublingual opening made the loop of the écraseur is to be passed, and the tongue being included, the latter is excised.

Billroth, in 1874, wrote on the removal of the tongue affected with cancer. He directs special attention to the cleansing of the mouth, and urges that more care be given to this than is commonly done. Through an incision, corresponding to the boundaries of the floor of the mouth, the tongue is drawn and cut off with scissors, and the vessels are tied as they are opened. The crescentic cut is next to be closed, excepting the lateral cuts which are left open for drainage.

Menzel operated in a similar way, yet, as preliminary, he tied the lingual arteries as advised by Czerny.

Axel Iversen, in 1874, wrote on the operation of removal of the tongue, both partially and in its totality. He opposes any method which mutilates much by extensive cutting, viz, division of the inferior maxilla. Although such mutilating operation be done when the growth is far advanced, it does not eradicate the disease, which soon recurs. Iverson advises to not operate in cases where the disease has extended beyond the papillæ circumvallatæ.

In cases where the affection has extended well backwards he prefers the method of Heyfelder and Yäger to reach it, viz, by an incision made through the cheek. Iversen operated in Copenhagen on several cases, in which he somewhat modified the cut of these operators, viz: Instead of a horizontal incision outwards from the angle of the mouth, he made an incision on a level with the teeth of the lower jaws This cut curved downwards, so that a flap was formed with convex margin looking downwards. Iversen claims as advantages for this incision that it shuns branche. of the facial nerve, avoids the duct of Stenson, and does not injure that part of the cheek in which the tendinous portion of the facial muscles lie. The wound heals by first intention, having been closed by twisted suture. Iversen condemns the use of the écraseur for the excision as an instrument both uncertain and painful, but recommends the knife and the galvano-cautery. He likewise claims that the ligation of the lingual artery does not guarantee against hemorrhage. He removes the affected glands, which is easily done when these are not adherent to the surrounding structures.

In 1881, Guillier, following the method of Verneuil, advises thorough removal of the cancerous tongue, and this at an early period; where the glands are affected he counsels their removal, and also the removal of the structures lying between the tongue and the glands. Recurrence in the lingual stump is rare, occurring oftener in the sublingual tissues of the floor of the mouth. To do this work radically, let an incision be made through the floor of the mouth from one angle of the lower jaw to the other, and this cut demands the ligation of the two facial arteries. A double ligation should be placed on each vessel and then the vessel may be divided between the ligations; the tongue is then to be drawn down through the crescentic cut and divided with the thermal cautery. If the disease is unilateral, remove only the affected half of the tongue, dividing antero-posteriorly with the écraseur. In case the palate and tonsil are affected, divide the lower jaw in the symphysis.

Whitehead, in 1881, published his method of operating; he dissects the tongue from the floor of the mouth, and then divides the organ near the epiglottis, tying vessels as they are divided.

Berg, a Scandinavian, finds that the lingual cancer has a special tendency to travel antero-posteriorly; exceptionally it passes through the raphe.

In 1881 Wölfler describes the method of operating then pursued by Billroth, who within thirty months had operated forty-five times. He does not divide the lower jaw nor make the submental flap as he once did, but now operates through the mouth, thus warding off septic pneumonia. He ties one or both of the lingual arteries; and the cut for the ligation of the artery may be enlarged and the diseased glands removed through it. He divides the frænum and the mucous membrane around the tongue so that the latter can be drawn well out of the mouth. Drainage is made through the floor of the mouth. Wölfler states that the secondary pulmonary affection which follows these operations on the tongue may be of a mild catarrhal character, which subsides in a few days; or there may follow a severe pneumonia from which the patient may recover, yet sometimes death is thus caused, the cause in all the forms being the swallowing of septic material, a part of which passes to the lungs.

Langenbeck's plan is to divide the lower jaw and then to excise the tongue with the thermal cautery.

The method of operating by Baker, of St. Bartholomew's Hospital, is as follows: To hold and fix the tongue a thread is passed through each side, a half inch from the median line; and, to loosen it so as to allow of extension, the attachments of the tongue are divided with scissors, the division being done close to the lower jaw. Next, the mucous membrane is to be divided along the median line and the two halves separated with the finger. This done, remove the diseased half of the tongue, and also any glands that may be affected. The removal of the glands is most easily done through the floor of the mouth by external excision.

Kocher operates by first performing tracheotomy and plugging the fauces. Then an incision is to be made along the anterior border of the sternacleidomastoid, and from the middle of the muscle carry a second cut to the hyoid bone, and thence along the digastric muscle to the symphysis of the jaw. The flap described is reflected aside, and the facial artery and vein and the lingual artery are then tied. Next, the attachments of the tongue are to be severed and the organ drawn through the opening and divided with scissors or the galvano-cautery. When the entire tongue is excised, tie the remaining lingual artery. The canula must remain in the trachea for some days, and the aseptic dressing should be removed twice daily from the fauces and new dressing placed there; and at these dressings the patient must be fed.

In Volkmann's plan, if the tongue can be drawn out the diseased portion is excised and the mucous membrane brought over the wound, which is closed by suture. Also, if a portion of healthy tongue remain, this is turned around so as to form a rounded end of the lingual stump. But when the tongue is more extensively affected, let a

thread be passed through it by which traction can be made; then an incision is made downward from the angle of the mouth, a canine tooth is extracted, and the jaw is divided at this point. Through the breach thus made the tongue can be drawn out and excised. The cut surfaces are then faced with mucous membrane and sutured. The jaw is to be sutured with wire. A drainage tube must be placed in the tonsillas fossa and carried out through the lateral wound.

Near this period Hueter and Lesser report extirpation of the tongue affected with epithelioma. Seven operations are reported, in all of which the lingual artery was tied. All recovered.

The operation of tying the lingual artery is now generally practiced as a preliminary to extirpation of the tongue. A description of how this may be done is here given:

From his experience in this ligation the writer would state that it may be either easy or difficult according to the conformation of the subject's neck. In one whose neck is long and with scanty adipose tissue the artery is easily found; but when the neck is short, thick, and laden with a thick couch of fat, the operation becomes exceedingly difficult; and it is no wonder that one surgeon was compelled to ligate the carotid artery.

Demarquay, in 1867, reported the ligation of the lingual artery in eight cases, and in 1868 he published a memoir on the subject. He claimed that the operation was not difficult to one well versed in the anatomy of the parts. He says the operation was first suggested by Béclard and was first done by Mirault. Besides, as a preliminary to excision of the tongue, this ligation may be done to control bleeding in wounds of the organ; and in such cases the hemorrhage has not returned after the ligation.

Demarquay counsels this ligation to retard the growth in cases in which the cancer has advanced so far that it can not be removed. At the time he wrote his article the ligation had also been done by Mirault, Roux, and Deguise. To reach the artery Demarquay, finds Blandin's plan to be the best. This is done by an incision made above the great cornu of the hyoid, and extending from the anterior edge of the sternocleidomastoid muscle to the median line of the neck. When the neck is short, as soon as the submaxillary gland is reached, open its capsule and let the gland be pulled upward. The digastric muscle and the ninth nerve are now brought into view. The artery lies in this field in a triangle formed by the hyoid cornu below, the hypoglossal nerve above, and the carotid artery behind. The artery lies just above the hyoid bone, and is displayed by a horizontal cut through the fibers of the hyoglossus muscle, behind which the vessel is hidden.

Near the same time the lingual artery was tied by Hueter in the operation of lingual excision. To find the artery Hueter incises horizontally above the hyoid bone, and uplifting the skin there is displayed what he names the lingual triangle. This triangle is bounded below by the two legs of the digastric muscle and above by the hypoglossal nerve. The digastric portions are the sections of the digastric muscle which lie before and behind the hyoid bone. The space included in the triangle does not exceed a square centimeter in surface. (A centimeter equals two-fifths of an inch in length.) Hueter does not deem the operation a dangerous one; on the contrary, Weichselbaum, who has written on the subject, pronounces the operation dangerous. When the disease occupies the middle portion of the tongue, Weichselbaum advises to tie both lingual arteries, since, according to Hyrtl, the dorsal portions of the lingual arteries sometimes unite and form a single vessel in the median line.

Anatomists have found that the situation of the lingual artery is not uniform in the first part of its course; exceptionally, instead of lying above the hyoid bone, it may lie behind it or below it. If the artery is not discoverable, the ligation of the external carotid should be done. The vessel should be tied as far backward as possible, since thus there remain no branches through which the blood can enter the

tongue. However, should the vessel not be discoverable in this part of its course, or if from inflammatory or cicatricial agglutination of the structures the vessel is not accessible, then it may be sought for more anteriorly. In its anterior portion the vessel may be found by making a horizontal incision midway between the inferior margin of the lower jaw and the hyoid bone. The exposed submaxillary gland must now be drawn upward by a transfixing tenaculum; and when this is done there is offered to view the anterior leg of the digastric muscle, and above this the hypoglossal nerve. In the space between these and lying behind the hyoglossus muscle lies the lingual artery. To find the vessel, divide the hyoglossus horizontally and cause this cut to gape, and the artery will be found.

This search for the vessel will be facilitated if the surgeon has recently dissected this region; for, no matter how accurate his anatomical knowledge may once have been, it is within the experience of the writer that sketches long ago copied in the mind wander in time from the true picture in nature; accurate correctness is only maintained by repeated rehearsals on the cadaver. As the linguist who would retain intact a language that he has learned must from time to time rehearse the rudiments of its grammar, so the operative surgeon, to do the best work, must ever and anon renew his early association with the cadaver. As a mnemonic guide which represents the site of parts that have a close relation to the lingual artery, the one subjoined has been constructed by the writer. In its posterior site C A D represents the initial letters of cornu, artery, and digastric, in the order in which the structures stand from below upward; anteriorly, after the artery has passed beneath the posterior leg of the digastric, the symbol D A N, represents the order in which appear, from below upward, digastric muscle, artery, and ninth nerve; and the two syllables conjoined form the word CADDAN. Such devices as amuse the memory; they become pebbles which, dropped into the tub of the Danaids, close some of the openings through which are wont to lapse so many of the facts which we store there.

The following cases of epithelioma of the tongue have been treated by the writer with results not unfavorable to operative interference:

Case 1.—Patient from Wallawalla, State of Washington, in which the anterior fourth of the tongue was the site of epithelioma which had advanced to ulceration: No glands affected. As there was a suspicion of specific disease, this was negatived by a course of iodine and mercury. The anterior third of the tongue was excised with the thermal cautery, but as the lingual arteries bled they were controlled by a circumscriptive suture. The patient has remained well ten years.

(2) Patient from Sacramento, with epithelioma involving the middle third of the tongue on the left side: Lingual artery was tied and a wedge shaped section removed from the side of the tongue. Recovery, without return ten years later.

Case 3.—Woman from San Diego, Cal., operated on similarly to preceding for epithelioma on the side of the tongue. Patient, when heard from a few months afterwards, was well; since then has not been heard from.

Case 4.—Case in which the epithelioma involved the right side of the base of the tongue and the side of the pharynx. The excision involved the internal carotid, so that it was necessary to ligate the right carotid artery, and, profuse bleeding continuing from the distal end of the internal carotid, the left carotid also was tied. Patient has remained well over five years. The case is fully reported in the Transactions of the American Surgical Association.

Case 5.—Patient from Chico, Cal., with epithelioma seated in the middle third of the side of the tongue. The lingual artery was tied and wedge-shaped excision done. The patient, operated on three years ago, remains well.

Case 6.—Patient from Eureka, Nev., with lingual epithelioma similar to preceding, and operation done similarly. Tongue remained well, but the disease recurred in the cervical glands some months afterward, and, although they were removed, the patient survived but a few weeks.

Case 7.—Patient from Nevada, the subject of lingual epithelioma, involving the body of the tongue. Ligation of both external carotids. Patient died of cerebral disease one month after the operation.

Case 8.—Epithelioma on the left side of the base of the tongue and implicating the lower part of the adjacent palato-glossus muscle. Glands near the angle of the jaw were implicated. The diseased structure was excised, the remaining wound thermally cauterized, and the affected glands removed. The disease returned six months afterward at the original side in the buccal cavity. Treatment by thermal cautery repeated, and patient has now been well eighteen months.

Case 9.—Epithelioma, involving the anterior two-thirds of the left side of the tongue, the inner surface of the inferior maxilla corresponding to the right and left incisor and bicuspid teeth; also the left submaxillary gland and contiguous lymphatic glands were implicated. After ligation of the lingual the diseased portions of the tongue and affected glands were excised, and the affected part of the lower jaw was thermally cauterized. Though the patient was 75 years old, he recovered in four weeks and has remained well for a year.

Case 10.—Epithelioma, involving the front portion of the inferior surface of the tongue, the sublingual gland, surface of the maxilla adjacent to this gland, the two ducts of Wharton, and glands near the submaxillary glands. After ligation of both lingual arteries, the anterior two-thirds of the tongue, the sublingual gland, the two submaxillary glands, and the adjoining lymphatic glands, which were swollen, were removed. The inner surface of the inferior maxillary arch was thermally cauterized. This operation was done four months ago, and as yet there is no recurrence. The after treatment consisted in frequent ablutions with alcoholized mint water. Nutrition was maintained by use of liquid food.

All of these cases, except case 9, were at ages between 40 and 55 years. The 9 men used tobacco. There was but little disturbance of speech except in case 10; yet he has so improved that his language can be understood. That limited or extensive glossectomy did not greatly interfere with articulation is not to be wondered at when it is remembered that in speech the tongue is only needed to pronounce the sounds of t, d, th, l, and r, in the last two the tongue being only partially an instrumental factor.

A summarized statement of the operative procedure pursued in the foregoing cases is here appended.

Except in cases 1, 4, and 7, the operation commenced with ligation of the lingual artery; in 4 the common carotids were ligated, and in 7 the external carotids were tied. The ligation of the lingual was done posteriorly, where the disease was situated far back on the tongue. The mouth being well opened by an interdental wedge inserted between the molar teeth on one side, the tongue, seized with forceps, was drawn out, and its protrusion aided by division of the palato-glossi muscles, as well as the lateral sublingual connections of the tongue with the floor of the mouth. With strong scissors the affected part was excised, the circumscribing cut lying in the sound strictures, as verified by sight and touch. After ligation of the lingual artery this cutting is done in bloodless structure. In some of the cases the submaxillary gland and contiguous lymphatic glands were affected; in such cases both were removed. If the inferior maxilla was implicated, this was cauterized with the thermal cautery.

The buccal cavity was diligently cleansed every two hours by irrigating it with alcoholized mint water, and such irrigation was always done after taking food. Four weeks sufficed for the recovery.

The operation was done through the mouth, and, thus performed, no visible scars were left to remind the patient or his friends of the interview of the former with the surgeon's knife.

SIMPLICITY IN SURGERY.

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The titles of successful books which have wrought a revolution in treatment encourages one, abashed at his trite subject, to believe that axioms repeated do not always fall to the ground unheeded.

Hilton's Rest and Pain, Mitchell's Fat and Blood crystalize into laconic brevity whole methods of treatment that were loosely known and sporadically practiced before the books appeared, but under the master hands of their authors assumed

definite and recognized importance, as well as formulated out loud what common sense had been whispering all along. It is with a moiety of this feeling that the writer ventures to bring before your consideration the generally admitted desirability of simplicity in surgery, conscious that there is no one present who would contend a moment against its advantages theoretically, but suspecting that some distinguished surgeon may be tempted to neglect it in improving some operation or making an additional attachment to a speculum, another trust to a suture, whereby to hang his name.

The generous desire to contribute to science, coupled with a more selfish, but equally ardent, desire to promote one's own reputation, makes us over and over again underestimate the value of simplicity in our endeavor to produce novelty, no matter how complicated; yet, when we consider sober facts, and take a bird's-eye view above the arena of competition, we find good reasons for the faith that is in us.

Simplicity marks the termini of science; it is characteristic of the beginning and of the end. Not the end in the sense of annihilation, but of perfection. The simplicity of the beginning is that of ignorance, of lack of knowledge; then comes a tentative period, in which a host of adjuvants are tried in the balance and often a host found wanting; by evolution the fittest survive, and when perfection is attained we see the course strewn with futile impedimenta, sometimes with arms and legs and lives that have perished in attaining that ideal, having some of the original, with an impress here and there of the accidental, but complications have been cast aside and the simple shines out.

The immortality of a discovery is often proportionate to its simplicity; the more it is handicapped the less likely it is to make a place in the race.

There is one complex factor in surgical science, however, that can not be simplified, and that is Nature herself. With centuries of study, her ways are still past finding out, and in dealing, as surgeons do, with her processes, we may take it for granted that we are still far from sounding the recesses of her depths for good or ill. The blood is a fair example of her complexities. This most common and easily analyzed tissue of the body constantly presents new features or substances that biologists a decade ago never dreamed of. What with Ehrlich's lymphocytes, mononuclear leucocytes, transitional forms, polynuclear leucocytes, eosinophiles, and the pros and cons of phagocytosis, the mysteries of chemotaxis, the antiseptic qualities of the serum, one would think enough complexities were added to hemorrhage to fill the maw of the pseudo-scientist, who, like Helen's Babies, desires nothing so much as to see the 'wheels go round.'

But Nature can afford perplexities because she is the product of an Almighty Hand whose omniscience knows her whole detail, but the finite surgeon must know how he adds strings to his bow with his limited powers of observation and less power of control. * * *

Taking Nature with her complexities as one factor in surgery, then the assistance rendered by man should aim at simplicity, for such practical reasons as the following:

Simple methods are more applicable in place and time. The surgeon who perfects an operation that can be done in a hovel as well as in a hospital is a benefactor indeed. More so if it can be done in a half instead of an hour. The pocket-case operation is a greater boon than its conjener requiring highly specialized surroundings; there are more wood floors than tiled pavements in the world, and the more we render the labor unessential the better. Do not misunderstand me as undervaluing the vast benefits and comforts of a carefully appointed operating room or the superb results of careful technique. I would not sacrifice an ounce of security for a pound of simplicity, but even in the wards of hospitals, or the costly rooms of specialists I would reiterate, be as simple as possible, endeavor to rid your technique of complexities, and above all, down the personal equation of frills and fads. Teachers of surgery must know that medical students are mostly men of mediocre minds, fresh from the

farm or the loom, whose intellectual horizons are checkered by counties rather than continents, with limited absorbing power. To teach these men complicated methods is to open avenues of disaster in humble homes throughout the land. What they need is a firm foundation on simple principles, homemade appliances rather than store apparatus. Electric lighting is all very well if you have the plant, but teach your students to rub sticks rather than freeze.

Personal experience tells me, from my own feelings toward a distinguished master now past the goal, that I loved him for the gentle simplicity of his character as much as I admired him for his unostentatious learning.

It is beyond the scope of this paper to attempt to take up, seriatim, operations and contrast the simple and complex methods of attaining the same end. Suffice it to look in passing at a few of the more involved procedures, and judge for ourselves whether or not they can profitably have some of the chaff beaten out of them. In the first place there is nothing more variable than the antiseptic method of wound treatment nor multiple than the so-called essentials of technique. The mist that hung around the operation has at last been raised by Mr. Lister himself, but the numerous adjuncts which many consider *sine qua non* still litter the operating room. From the old surgeon, whose mind is trammeled by the cobwebs of laudable pus, to the novitiate, who has a list as long as his arm to prepare before opening a boil, there is every gradation; yet when you bear in mind three cardinal points: (1) that surgical cleanliness is essential; (2) that the less interference with clean wounds the better; (3) that boiling is practically a perfect germicide—your armamentaria need not be extensive.

The first can be attained by soap, brush, and a few bichloride tablets for a mild bichloride solution, to apply, not to wound surface, but adjacent parts; the second speaks for itself.

The third, boiling, covers the ground of instruments, ligatures, sutures (if you confine yourself to silk, and well you may after the disasters lately reported from catgut), and as far as rendering your dressings aseptic. Should you wish to make them antiseptic, and thus prevent the backward infection of your wound from decomposing drainage, gauze wrung out of the bichloride solution prevents that until it has dried and become impermeable. My own custom when I know I am going to operate is to put instruments, needles, silk, gauze (drainage tube, if necessary, though I prefer a gauze strip usually, and substituting perforated mica films, found in any store, for unboilable rubber protection).—I say I place all these in the ordinary agate-ware trays in a tin boiler full of water, put them on the kitchen range, boil for an hour or less, and when ready to start put the boiler in the back of my wagon. After cleansing the patient and my hands with soap and bichloride solution, I have everything else aseptic at hand in my trays arranged conveniently for the operation without fear of infecting ligatures, etc., by touching their sides, as the boiling has made the trays clean, too. By ringing the boiled gauze out in a mild bichlor solution I have an antiseptic as well as aseptic dressing, while my ligatures, sutures drain and instruments have not been exposed to the destructive influence of corrosive sublimate. Over all a linen bandage, wrung out as above, forms the proper compression of dead spaces and gives a splint like firmness to support the part when dry. The nonirritating boiled gauze drain is removed in forty-eight hours if used, and the wound pursues a typically satisfactory course under two dressings for two or three weeks, when the sutures may be removed after the wound has healed sufficiently to offer resistance to any possible infection from the drawn out sutures. That is simplicity itself. One drug, bichloride tablets, the rest the ordinary *vade mecum* of a surgeon plus the usual chattel of a farmhouse, i. e., clothes boiler and stove.

If called in an emergency I have all I require for a great many operations in my pocket case, and again and again I have operated in strangulated herniæ, compound fractures, crushed skulls, with success, with no greater outlay; nor would I hesitate to do laparatomy if in addition to the above I had provided three feet of rubber tubing for irrigation.

I can not insist too strongly on the value of noninterference with wound surfaces. The fewer the ligatures, the less strangulation of tissue, and the least constant suture that with judicious pressure will avoid dead spaces or interfere with the blood-clot organization, the better. Can anyone estimate the cost in lives due to neglect of the above precautions in gunshot wounds alone? What simpler treatment than to leave the ball alone, provided it has not taken with it foreign matter in the shape of clothes, and provided no large vessels are wounded or cavities opened in its course. Is it not better to have the reporter's opprobium, "the doctor failed to remove the ball," than to infect the punctured wound with pick and finger and convert this natural test tube into a pus pocket? My experienc teaches me it is, and I seldom rummage for a ball unless there is evidence of complications other than the presence of the ball alone. Knots and sutures have offered to worthier surgeons a field to strew with complexities. Do you think your hands could hold the knots that would embarrass a sailor to tie, and yet the ordinary reef-knot so minutely described as a tangle in most operative surgeries holds about as fast as any of its substitutes.

Sutures bob up and sink in surgical literature all the while. The intestinal suture alone from Raindohr, in 1780, to God knows who the latest is, has been twisted and turned with a surgeon's tag at each twist for more than a century, on an average of ten a decade, and the simpler ones survive. Treves, in his excellent work on Operative Surgery, enumerates Dupuytren's, Gely's (three stages), Cushing's, Lembert's, Czerney's, Halsted's, Jobert's, etc., and, after weighing their value, says:

Lembut's suture has stood the test of time, and it may be safely said of it that it is, on the whole, the best form of suture with which we are acquainted. Why? Its extreme simplicity, the rapidity with which each stitch can be inserted, and its undoubted efficiency are points in its favor which all operators have recognized. (Manual Operative Surgery, Vol. II, p. 313.)

In treating hemorrhage Esmarch's bandage has come to stay, because it is simple and can be improvised at once. We see Weir applying it, modified, to his hip-joint and shoulder amputations, while the more complicated and less certain rectal or abdominal pressure pass down. Does anyone hear nowadays of Simpson's acupressure, with its three methods of torsoclusion, retroclusion, etc.? They exist in text books probably as a test of the enthusiasm of the student who, having pluck enough to wade through these descriptions, may be counted worthy to enter the ranks of the profession. I was asking an old general practitioner the other day who had not kept up his surgery, if he recalled any of the operations for the permanent cure of hernia. He said: "I recall a misty remembrance of labyrinthian sutures and trusses that a fair Rosamond could not unravel." That must be the experience of all who have not looked into that domain of surgery for the last score of years. Even in modern books there is a sort of fetich worship in repeating, only to damn, those intricate and ineffective inventions; but the end is not yet—the modern methods are too involved. Some need a particular needle, or pair of them, as in McEwen's; others alter the relation of the cord and put the vas deferens at a more than normally acute angle, possibly reducing its caliber and tending to invalidate the testicle, and as a general evidence that none has reached the desired simplicity each inventor gets better results from his own operation than from his colleague's or from those who attempt to follow in his footsteps, no matter how lucid the descriptions and graphic the plates.

"No one method can be rigidly adhered to or be considered all-sufficient," is a a criticism of a modern judge. Why? Because they lack the staying power of simplicity. The title of surgeon from its derivation indicates that handicraft is one of his endowments, but he must be careful not to let the mechanic run away with the man, or substitute pulleys for common sense.

In a recent article on simplicity in the treatment of fractures, Roberts' Philadelphia Medical News, July 8, 1893, says:

A truly wonderful illustration of this perversion of mind is found in Baudenheuer's Guide to the Treatment of Fractures. I show a single illustration taken

from his book in proof of my statement. Could anything be more preposterous than the method by which a patient with an ordinary fracture of the lower end of the radius is here treated? He is shown confined to bed with weights and pulleys attached to his arm and hand, so as to make traction in five different directions. Such a method of dealing with an injury which ordinarily needs scarcely any splint is a travesty of modern surgery.

And then to show how surgeons are prone to multiply good things, he speaks of a case of fracture of the thigh, in which the man had on a Physick's long splint, a Buck's extension, and plaster apparatus applied for his single fracture sufficient for three patients with a like injury.

I can not go into this part of the subject without plagiarizing from the article just-quoted, which covers the ground, but I would reiterate the cheapness, adaptability, comfort, ability to inspect parts associated with the ordinary plaster or starch splint well lined with cotton batting and split down the middle when swelling is expected, with fenestra over compound fractures or wounds, rather than the machines sold at instrument-makers'.

Again, the use of neighboring parts, not only as standards of measurement, but as means of treatment, is hardly sufficiently appreciated. The upper jaw is an excellent splint for the lower, the side for fracture of the humerus, while the serrated edges of Colles's fracture hold themselves together almost unaided, provided the displacement is properly reduced, better than Bond's and Nélaton's and the host of splints that figure in text-books in this connection.

In the treatment of dislocations the same history repeats itself. It is not the man who has invaded the junk shop and produced pulleys and ropes and torture who is immortal, but such as Bigelow, who found a ready-made pulley in the Y ligament and turns its mechanism to the patient's profit; and so one might go on through general surgery to special and see the simple principles endure, the complicated perish.

A good judge of human nature and one who made millions thereby once said, "The public love to humbugged." Probably if wealth were the only reward of the surgeon that dictum would hold good with us. People generally prefer to think themselves at death's door with a Latin disease rather than be ailing with an ordinary English monosyllable; but, in the long run, the man who does not yield to such temptations and tells people no worse than they are earns the respect of his fellow practitioners and the confidence of his patients. The lying pessamist soon exhausts his Pandora's box of desperate situations, and people will employ the man who does not steal their sleep by false anxieties.

Nowhere is simplicity of more value than before a jury. The expert who can bring himself down to everyday expressions and call a spade a spade has the good-will of the boxfull of men, just as dear old Sellers gained it by inquiring how folks were at home. You can't fool all the people all the time, and as one can never know exactly when they are ripe for fooling it is better not to attempt to fool any of the people at all.

Now, one word more in regard to simplicity of nomenclature. Names should mean something and carry an explanation in themselves. How much more satisfactory and easy to recall in its relations is the sterno cleido mastoid muscle than the valve of Vieussens, because the former means something; the latter is a monument without a description, and such monuments are apt to get mixed, maybe, damned for inaccuracy, as Bright's disease is associated with parts unmentionable. The circle of Willis has an enviable position, but the glandulæ Tysoni are not so desirable name sakes. In conclusion, let me again emphasize the appreciation of the unavoidable and immense complexities in investigating natural processes in the laboratory and how essential such complexities are, because results are the fruits of elimination and one-by-one casting away of useless appendages which no *a priori* method could simplify, and while recognizing these essential complexities of the laboratory, let me again emphasize the great benefits of simplicity in the application of results at the

bedside as in the amphitheater. In other words, the brushing away of branches, the crushing, if need be, of blossoms, the stripping of leaves when we wish to grasp the fruit, and the fruit only, of the tree of knowledge, and to press its luscious juices to the parched lips of our patients.

On Dr. Johnson's paper, Dr. Quimby remarked as follows:

I fully agree with Dr. Johnson in the conclusions of his very able paper. His criticism against undue complications in surgical dressings is very timely. Harm often follows this error. The great men in medicine seek the simplest and plainest methods to accomplish this end. Lister's spray method was most complicated, and great difficulty followed the effort to get the patient ready for an operation. I have known poisoning to follow the use of Lister's spray when used in large exposures of wounds in abdominal operations. To-day this method by Lister is abandoned, and the author has given up its use. The drainage tubes have had the same experience of being popular for a time, then dying away. Surgeons failed to recognize that drainage tubes were foreign bodies, which did injury rather than good, by their too long retention in the wounds. Drainage tubes are of limited value, and should only be used for a short time. Shortness of time, simplicity of operations and dressings, should be the motto of the prudent surgeon.

THE TREATMENT OF BONE CAVITIES BY FILLING WITH COPPER AMALGAM.

By Dr. OSCAR J. MAYER, San Francisco, Cal.,
Late Assistant on the Surgical Staff, Moabit Hospital, Berlin.

The short time allotted to me prevents me from reviewing all the work that has been done in regard to healing bone cavities. I shall only call your attention to some experiments I have made in the Moabit Hospital, in Berlin, during my time of service on the surgical staff, with a view of obliterating bone cavities by means of plugging the cavity with inorganic material, following in the main the manner in which dentists fill carious teeth.

After attending a lecture of Prof. W. D. Miller, delivered before the Association of American Physicians in Berlin, where the pathological conditions of carious teeth were demonstrated and the properties and antiseptic actions of some fillings explained, it occurred to me that some of these metals could be used in bone-filling in place of other materials I had experimentally tried.

That foreign bodies can become encapsulated within soft tissues, as well as bones and even vital organs, is an established fact which we often witness in gunshot wounds where the bullet is allowed to remain. Although the conditions upon which the permanent encapsulation of fillings into bone depend are by no means so simple as in the case of carious teeth, the investigations and experience of the dental profession must of course form the basis of our experiments.

Above all, it was clear that the material used for fillings must be not only aseptic, but actively antiseptic, since it is certainly out of the question so to disinfect at one sitting the cavities which remain in the bones after chronic osteomyelitis or tuberculosis that all the bacteria in them are destroyed. If the filling is to become encapsulated it must, by virtue of its antiseptic properties, act upon the colonies of micro-organisms which may still be present, and thus destroy the exciting causes of the inflammation. Furthermore, such fillings must consist of a material which is light, nonpoisonous, and which hardens rapidly.

I am encouraged to make the present demonstration because of the interest a former presentation aroused at the Twenty-second Congress of German Surgeons, and because I am desirous that the investigations so far made may be tested by others and perhaps brought near to completion. For, although the question whether such fillings can heal into bones will soon be definitely answered, it will require years of observation to ascertain whether this method of bone-filling is to be regarded as an enrichment of surgical procedures.

Experiments were made with various metallic mixtures of as low a melting point as possible; among others, with the alloy of Wickersheimer, which melts at 55° R. (156° F.), and the alloy of Lipp, which melts at 63° R. (174° F.). But it soon became evident that these mixtures could not be of service, as they solidified in the funnel and, even if no funnel is used, the mixture does not flow properly if poured into a cavity which is below the above-mentioned temperature. Attempts were made to transform aluminium into a soft mass, but as yet without success. With mercury, aluminium forms a spongy, porous mass, such as has been noticed when instruments of that metal have been put into a solution of bichloride.

Copper amalgam was made into a dough-like mass, in the manner customary in dental practice, by heating it in a spoon over an alcohol flame, and rubbing it to a pillular consistency in a mortar, the cavity was either completely filled with the mass, or only coated with it, and a lighter filling material, as cement, gutta-percha, etc., used to fill out the defect. Plaster of Paris * (after TRENDLEBURG), was not at first used, because it is more porous and heavier than the above-mentioned substances, and not so easy to manage, and also hardens more slowly, and is more liable to soil the surface of the wound. On account of the well-known instability of carbolic acid it is not to be supposed that plaster of Paris fillings made up with a 5 per cent solution of carbolic acid instead of water will have any lasting antiseptic effect on the surrounding tissue. In one experiment, as we shall see further on, I used plaster of Paris after the cavity was coated with copper amalgam, but, as will be observed, a great deal of shrinking took place.

Of cements, the Harvard cement of Dr. Richter is particularly worthy of mention. I had made for my use a quantity of the lighter white sort of this cement which shows the fewest pores. It also requires a much shorter time for hardening than any other cement, and shows no shrinking after hardening. On account of the expense of the latter, I have set to work and experimented with a number of different cements and putties and found that one of the most reliable, and at the same time very inexpensive, cements that could be obtained is the oxychloride of zinc. I used this in my latter experiments in connection with the copper amalgam; its preparation is as follows: Zinc. chlor. 4 parts, aqu. dest. 5 parts, glycerine, 3 parts. Of this solution 10 c. c. is intimately mixed on a slab by means of a spatula with 10 grains of oxide of zinc. It will remain in a putty condition for about four or five minutes and then set and show upon being split with a hammer and chisel, none, or very fine pores. Use was also made of Abbey's noncohesive gold foil, the antiseptic effect of which had already been shown by Miller.

On account of the troublesome technique required to properly apply copper amalgam, the substance which shows the most marked antiseptic effect on plate cultures of bacteria, I made use in some experiments on animals, of coarse fillings instead of the dough-like mass. The cavities were coated with this and then filled out with cement, gutta-percha, etc. We shall see, after describing the post-mortem condition of the bones that have undergone filling, which is to be preferred.

The property of copper amalgam to check the development of various sorts of pathogenic and nonpathogenic bacteria has already been shown by Miller,† even in the case of fillings of this metal which had been carried for years in the teeth. This has since been confirmed by Behring‡ in his article on the means and method of dis-

* Dreesmann, Knochenplombirung, Beitr. z. klm. chir. IX, Heft. 3.

† Mikroorganismen der Mundhöhle, 2. Auflage, 1893, p. 277.

‡ Desinfection, Desinfectionsmithel, and Desinfectionsmethoden, Zeitschr. f. Hygiene, Bd. IX.

infection, and I have been able to show a direct antiseptic effect by the death of bacteria in plate cultures. I prepared in the usual way plate cultures on agar-agar of bacteria (Staphylococcus aureus, Staphyl. albus, Streptococcus, etc.), and after the colonies were fully grown placed a copper-amalgam filling on the plate. Before putting in the fillings inoculations were made from the plates on agar tubes, and after twenty-four hours other inoculations were made from colonies within a space of 1 to 2 cm. from the edges of the fillings. In spite of many attempts, nothing ever grew except in the tubes inoculated before the fillings were put on the plate.*

It is worthy of note that the greenish discoloration appears much sooner and more markedly, and spreads over a larger space, if the metal is put on a plate on which the cultures are already grown, than if it is put on immediately after the preparation of the plate; in the latter, only a narrow green ring is formed around the filling; perhaps the more extensive discoloration is due to the chemical changes produced by the bacteria. Copper amalgam of various manufactures were used, and at one time it seemed that some possessed more marked antiseptic properties than others, but this was a result obtained during the time my incubator was out of order and shows that if the plates are exposed to ordinary room temperature the free space surrounding the copper amalgam will be much larger than if the plate cultures are at once transferred to the incubator that registers 37° C.

The animal tests were made on dogs, some of which were operated at one, others at two sittings. In order to get the filling closely into the bone defect, it is desirable to have the cavity as dry as possible. In this case we are confronted with considerable difficulties with which the dentist does not have to combat, for we have to deal with a tissue richly supplied with blood, while the dentist has only to excavate the tooth, dry it with the hot-air blast, and separate it from the mouth with rubber sheeting, in order to obtain a perfectly dry surface, such as we can not obtain even with the tampon and the Esmarch's constrictor. I have made use of the hot-air blast, and after considerable modifications I had constructed a hot-air blast by which a strong stream of hot air of 70–80° C. is obtained. It consists of a spiral platinum loop 20 cm. long which is lighted by an accumulator supplied with 40 cells. It works very much on the style of a Paquelin thermo cautery, a continuous supply of air being driven through the platinum loop by a double blast. Before drying out the cavity with this, I swab with alcohol and ether in order to facilitate the drying up. Pressing in the filling will cause a slight capillary hemorrhage, not enough however to cause any disturbance.

Experiment 1.—Bitch, six months old. In morphine narcosis the upper epiphisis of the left tibia was chiseled open, the periosteum being also taken away and the medullary portion gouged out with a sharp spoon. The hemorrhage was checked by tampons, swabbing with alcohol and ether, and use of the hot-air blast, and the cavity was coated with prepared copper amalgam. During the filling a little blood had to be occasionally wiped out—the hollow of the filling itself was not filled out—edges of wound closed with catgut sutures and a plaster of Paris bandage applied. The next day the bandage was found gnawed off and the stitches torn open; another bandage was applied, but as this also was torn off and the wound began to secrete, no further attempt at bandaging was made. By the third day after operation the animal used the operated leg for standing and walking and jumped into her stall without difficulty. The wound closed completely in eighteen days. On the twelfth day the depression in the filling was still visible through a little opening. Forty-four days after the operation the animal was killed, wound of incision completely cicatrized, of a reddish appearance, plainly recognizable. Inner side of tibia, where it was chiseled open, shows marked thickening; no fistula present. On sawing the bone through longitudinally, it appears that the filling has been made smaller by the formation of new bone tissue, the newly formed bone tissue having pressed upon it until the hollow which was in the filling had entirely disappeared. Only a slight crescent-shaped form shows that the filling originally filled a round bone defect, or rather covered it as a thin coating, leaving the middle of the cavity entirely empty. The surface of the section of bone in the neighborhood of the filling is

*Since the above was in print I have learned from Prof. Miller that he has also confirmed the above results by experiments on the pulp of living teeth.

somewhat darkened and discolored by the sawdust produced by sawing through the copper amalgam.

Experiment 2.—Bitch, 6 months old. In morphine narcosis the same operation was performed as in the former experiment, except that a filling of the Harvard cement of Dr. Richter was used instead of copper amalgam. Progress of the healing about the same; after fifteen days the outer wound is entirely closed; animal killed in forty-four days; the tibia shows marked thickening over the site of the filling. The filling is seen to be completely healed in without formation of fistula. In this case also the sawed surface in the neighborhood of the filling shows some yellowish discoloration, due to the sawdust from the cement.

Experiment 3.—Dog, 8 months old, operated in two sittings. In the first sitting the bone was chiseled open in morphine narcosis, the medullary portion removed with a sharp spoon, and a tampon of sterilized gauze inserted. Operation the following day without narcosis, tampon removed, the cavity lined with a coating of softened copper amalgam and then filled with Richter's Harvard cement, soft parts sutured with catgut and bandaged; bandage several times renewed, but always gnawed off; progress of the healing slower than in the preceding cases. In this case there existed a deep fistula, through which the filling can be felt with a sound. The filling, however, seemed to be firmly healed in, the fistula closed twenty-eight days after the operation, and the wound healed in the course of the next week; the animal was killed forty-three days after the insertion of the filling. In the soft parts the cicatrized fistula may be easily distinguished from the rest of the scar tissue by its more reddish color; the tibia being free from the soft parts, a not yet calcified spot may be recognized as the former bone fistula. It is, however, completely covered with thick granulations, which are connected on the inside with the bone tissue. It is much more difficult to saw through the bone in the region of the filling than in the preceding cases. After the bone is sawed through it is seen that a small portion of the gauze had been left in the cavity; the filling is considerably broken up, which I explain as the effect of the pulling of the saw teeth, which were clogged with shreds of gauze, upon the filling, which was not firm enough to stand such violent treatment. In this case also the neighborhood of the filling is discolored by the amalgam.

The next experiments were carried on to determine how older animals would stand the operation of bone filling, and whether the filling would become perfectly encapsulated, as also to find out which was the better technique, filling with softened copper amalgam, or that with coarse filings of the metal.

Experiment 4.—Dog, 8 years old, 16 pounds; morphine narcosis; the tibia is chiseled open as in the previous experiments. Instead of softened copper amalgam the coarse filings are used with Harvard cement. After sixty days the animal is killed; the defect in the bone over the site of the filling is partly closed with new bony tissue, partly with granulations. A fine sound can not be passed through anywhere. After sawing the bone open longitudinally, it is seen that the filling is somewhat torn; this seems to show that the filling does not fit as tight when the filings are used instead of the softened metal, as we witness this tearing of the filling in every case where the former was used.

Five more experiments were made with older animals, and, while all the fillings remained in and the wound became smaller, not enough time elapsed between the date of operation and the day the animal was killed to admit of a definite statement as to the time required in old dogs for the filling to become perfectly encapsulated.

So much in regard to the experiments thus far made. In addition to the successful experiments just reported, Prof. S. Sonnenburg has made use of the method of bone filling proposed by me on two patients suffering with chronic osteomyelitis, and, while they were unsuccessful, they still offer a great deal of interest and show that if properly made a filling can become encapsulated. The operations were made at a time when the technique was anything but well tried. Again it shows that no one should attempt bone filling in the above manner with copper amalgam until after he has practiced it either on the dead or lower animals and acquainted himself thoroughly with the different manipulations. There is a decided difference between simply filling a hole in a bone and the proper adjustment of a filling to a bone cavity.

One filling came out after about two months. It had been tightly held for about fourteen days when it became loosened and gradually expelled. Right behind the filling was found a sequestrum about one-fourth inch broad and 1 inch long, which evi-

dently had been overlooked at the time of operation. The filling itself, as will be observed, is rather irregular, instead of being evenly covered with copper amalgam; the latter has been crowded on to one position. It will be seen that on one side newly-formed bone tissue is closely attached to the metal and cement. As these cases will be reported by Prof. Sonnenburg, I shall not lose time in dwelling upon them here. One case of bone filling for chronic osteomyelitis of ten years' standing, in which I have inserted a filling weighing approximately 120 grains (4 ounces), has been left to me by Dr. Riegner, director of the surgical department of the All Saints Hospital in Breslau. The results of this case will be published by the surgeon in charge as soon as definitely known.

No one is more conscious of the incompleteness of this work than myself, and in giving it I entertain hopes that those of you gentlemen who have material at their disposal will take up this subject and reveal whatever merits it may possess and give the results whatever publicity they deserve.

In addition I have tried copper amalgam in the treatment of chronic gonorrhœa by application of sounds covered with that metal. Experiments are also in progress to see whether O'Dwyer's intubation tubes covered with copper amalgam have any direct action upon the primay herd in diphtheria and are capable of preventing the downward spread into the trachea in this disease.

SUTURA DE LA VENA BRAQUIO-CEFÁLICA.

Por el Dr. FRANCISCO MARÍN, Puebla, Méjico.

El primero de mayo de 1889 entró al Hospital General del Estado de Puebla M. R., herido por arma de fuego. Pistola, 44 de calibre. Tenia cuatro heridas. La primera estaba colocada inmediatamente encima de la articulación esterno-clavicular izquierda. La segunda, que era la abertura de salida de la anterior, estaba sobre la clavícula derecha, en la unión de su tercio interno con el medio. Volvió á penetrar en el hombro del mismo lado á tres centímetros adentro y abajo del acromion y por última salida, la hizo sobre la cara externa del hombro, á un centímetro debajo del acromion.

Interesó la articulación externo-clavicular izquierda, caminó en seguida en el tejido celular del cuello, despues detras del sterno-cleido-mastoideo derecho cerca de sus inserciones á la clavícula, haciendo salida arriba de este hueso inmediatamente afuera de su haz clavicular. Las heridas del hombro fueron subcutaneas. Hacia dos horas que habia sido herido. Este hombre estaba pálido, exangüe, tenia síncopes, sudores frios y el pulso pequeño y débil. La hemorragia habia sido bastante abundante: sangre venosa negra salia por la abertura supraclavicular. El escurrimiento sanguineo tenia esto de particular: no salia durante la inspiración y si el enfermo estaba quieto y tranquilo la sangre que se perdia era poca cosa. Al menor esfuerzo que hacia el herido, la cantidad de sangre aumentaba de tal manera que poco antes de mi llegada á la sala de operaciones, habia sentido la necesidad de evacuar. Se habia sentado y en el esfuerzo que hacia para defecar habia perdido una cantidad considerable de sangre que determinó un síncope. El líquido sanguineo habia corrido hasta debajo de la mesa.

Acompañado del Dr. H. Gonzales y C. Lopez, procedimos al exámen de las heridase y sobre todo á la de aquella por donde salia sangre. Nos cercioramos de que el sitio de la hemorragia estaba profundo y decidimos hacer un debridamiento que comprendió el haz clavicular del músculo sterno-cleido-mastoideo. Esplorando la región descubierta veimos salir el líquido de la parte más baja y profunda correspondiendo á la confluencia de las venas del cuello. Levantamos el haz dividido del músculo, y esponjeando y observando con atención vimos el sitio de donde manaba la sangre. Aplicamos pinzas hemostáticas, tratando de pasar una ligadura lateral; pero no

obtuvimos ningun resultado. Entónces volvimos á ver con sumo cuidado y descubrimos una fisura ó hendidura mayor que un centímetro, verticalmente colocada sobre el punto en que se forma el tronco braquio-cefálico derecho, por el anastomosis de la yugular interna y de la vena subclavia del mismo lado, y por este sitio vimos salir la sangre durante la expiración. Las paredes de la abertura se aplicaban una contra otra en la inspiración, circunstancia feliz que habia impedído la entrada del aire en las venas.

Comprimimos con una esponja y discutimos lo que debiamos hacer. La ligadura lateral la habiamos intentado sin resultado; la ligadura de las venas afluentes era casi imposible. Dejar un tapon de gaza, era un medio incierto y peligroso. Entónces pensé en hacer la sutura de la hendidura de ese grueso tronco venoso, y una vez decidido, con una aguja delgada, ligeramente curva, ensartada con catgut fino, pasamos tres puntos de sutura entrecortada, despues de haber bien limpiado la herida y descubierto las paredes venosas. Los puntos fueron apretados suavemente. La hemorragia se detuvo completamente y aun cuando el herido hiciera esfuerzos ya no salia sangre. Las suturas habian interesado todo el grueso de la pared venosa. Hicimos la curación, y algunos dias despues hice la sutura del músculo que habiamos dividido.

Ningun accidente se presentó durante la curación. El herido salia del hospital un mes despues, sin que durante todo este tiempo se hubiesen presentado signos de oclusion ó trombosis venosa.

Otro caso es el siguiente: A fines de julio de este año de 1893, operamos á un ingeniero alemán, F. K., de 50 años de edad. Le habia yo amputado hacia dos años la pierna derecha por una úlcera extensa y rebelde, probablemente una degeneracioñ epiteliomatosa de los botones carnosos, que le habia confinado en la cama por mucho tiempo. Habia tenido muy buena salud desde que fué amputado; pero últimamente aparecieron en el triángulo de Scarpa varios ganglios degenerados, entre ellos uno tan grande como una manzanita. Lo asistia mi hermano, José Maria Marín, y fuí llamado por él, para proceder á su extirpación, por que el exámen histológico habia revelado una degeneración carcinomatosa. La operación fué un poco difícil. La vena safena estaba envuelta por el grueso ganglio, y sus paredes se habian hipertrofiado invadidas por la degeneración. La extirpación de estos tumores cancerosos nos dejó una gran pérdida de substancia, en cuya profundidad estaban descubiertos una porción de los músculos pectíneo y del aductor medio. La extracción de los ganglios fué acompañada de fuerte pérdida de sangre. Las venas que atravesaban el tumor fueron ligadas.

Al terminar tuvimos una fuerte hemorragia venosa; venía de la crural: en un momento se nos llenó de sangre todo el hueco dejado por la operación. Comprimiendo y esponjeando, pudimos ver que la sangre venía de la vena femoral. Mi hermano aplicó, abrazando los bordes de la herida venosa, los ramos largos y delgados de una pinza hemostática, paralelos á la dirección de la vena, de tal manera que cerrara la abertura por donde salia la sangre. Entonces con catgut fino, en agujas ligeramente curvas, pasamos una sutura del colchonero inmediatamente abajo de las pinzas, teniendo especial cuidado de no picar la artería crural inmediata á la vena. Pasados tres puntos, tiramos ligeramente de las extremidades del hilo y quitamos las pinzas. La hemorragia se habia suprimido y aun cuando el enfermo hiciera algun esfuerzo, ya la sangre no salia. Pudimos estar ciertos de que no habíamos obliterado el vaso, porque la sutura habia sido casi á la superficie de la vena, y esta es bastante gruesa. Hicimos con las extremidades del hilo un doble nudo, teniendo cuidado de no estirar para no fruncir las paredes venosas, ó que se encorvaran y el calibre de la vena se obliterase. El enfermo estaba en via de curación, cuando salí de mi país.

Lister ha cosido con catgut fino los labios de la axilar por herida. Schede lo hizo con la femoral, y Czerny suturó la yugular interna, haciendo una esofagotomia. Yo no tenia conocimiento de estos hechos cuando suturé el tronco braquio-cefálico. Algunos autores al hablar de estas suturas dicen que los procedimientos son poco conocidos, mal arreglados y que es más fácil y de mejor resultado el aplicar una

pinza sobre la abertura de la vena ligando la pared, ó sea la ligadura laterál. Esta es la práctica más común siempre que se pueda ejecutar, es pronta y expedita: pero se pueden encontrar hechos como el que he referido y en el que la sutura dió un resultado completo, siendo su ejecución no difícil y bastante segura para cerrar la abertura relativamente grande que tenía ese grueso tronco venoso.

En los casos urgentes, el cirujano hace uso de los procedimientos generales, aplicándolos á medida de las necesidades que se le presentan y creo que la sutura en las paredes venosas es una de tantos medios útiles para contener las hemorragias. En el herido del cuello se encontraron circunstancias realmente excepcionales, que dieron tiempo para ejecutar la pequeña operación que cerrara el vaso herido. Pocas semanas antes veia yo morir de hemorragia á un hombre herido en la raiz del cuello y perdía la vida cuando le comprimía el lugar por donde salia la sangre, sin darme tiempo ni para pensar lo que debia hacer. Esto prueba que las indicaciones y nuestra conducta activa cambian segun cada caso particular, y que no pueden existir reglas absolutas para dirigir nuestra conducta. Me parece preferible hacer la sutura siempre que las circunstancias la hagan relativamente fácil á la de dejar en una herida pinzas hemostáticas por más ó menos tiempo: por supuesto, despues de haber intentado la aplicación de la ligadura lateral de las paredes y que se trate gruesas venas. Esta ligadura es utilísima en las operaciones. La ensayamos sin éxito, en el hecho de que me ocupo.

Duplay y Reclus citan en su última obra el caso observado por Maisonneuve. El tronco braquio-cefálico venoso habia sido abierto con un puñal. La herida cutánea tenía un centímetro y medio, y estaba colocada encima de la horquilla external y fué reunida por sutura entortillada. La curación se efectuó. Dichos autores aseguran que es el único caso conocido de curación de una herida del tronco braquio-cefálico venoso. Este hecho es muy parecido al mio con esta enorme diferencia, de que Maisonneuve no descubrió el tronco y aplicó una sutura compresiva sobre los bordes de la herida cutanea. Produjo la hemostasis indirecta por compresión, mientras que en mi caso la aplicación de la sutura fué inmediata sobre el tronco venoso.

CONCLUSIÓN.

En ciertos casos la sutura sobre los troncos venosos puede ser eficaz, siempre que se presente una indicación para hacerla.

La experimentación sobre los animales producirá tal vez resultados dignos de consideración.

UNUNITED FRACTURE.

By LLEWELLYN ELIOT, A. M., M. D.,

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It is with much hesitation I appear before such an august and critical assemblage of surgeons as are gathered here, for I feel that nothing I may say will appear new to the majority of you. The subject—ununited fracture, delayed union, pseudarthrosis—has received attention at the hands of writers on surgery from the earliest time, and has engaged the attention of the best and ablest surgeons. To follow its literature would be an almost endless task, and to review in detail the various methods of treatment would occupy much more time than I desire to consume.

According to writers on surgery, firm union between the fractured ends of a bone may sometimes be delayed beyond five or six weeks, the period of time usually

required for their repair. This condition constitutes what is termed nonunion, ununited fracture, or pseudarthrosis. This delayed union may be temporary or permanent; it may correct itself or it may require the intervention of the surgeon. The character of the union in these cases is of a fibrous or ligamentous nature, or is a proliferation of brittle callus.

The causes of this nonunion are divided into two classes, those of a constitutional character and those of a local character. Among the constitutional are hemorrhage, scorbutus, diarrhœal diseases, excessive lactation, pregnancy, shocks, any state of the system attended by a diminution of the vitality of the patient. The reparative process itself may be at fault, since the callus thrown out about the fractured ends may be so proliferative that it softens and dissolves before it has performed its part in the repair, or it may become so brittle as to be useless. Old age, cancer, paralysis, rheumatism, and syphilis are passive, and not active, constitutional causes, although the contrary is strongly asserted. As local causes we enumerate the interposition of a foreign body between the ends, such as a piece of muscle, tendon, or clothing; the destruction of the blood supply of the bone; improper adjustment of fragments; defectively applied fixation apparatus, where the fragments are not held in a proper position, but are movable. More cases occur in hospital practice than formerly, as the hospital internes are allowed greater liberty in the treatment of fractures to-day than they were accorded some years ago.

There should be no difficulty in the diagnosis of cases of nonunion after fractures. The condition, as a rule, is apparent. The treatment of cases of ununited fracture must be in accord with the cause of the delay. Iron for the anæmic, iodide of potash and the salicylates for the rheumatic, mercury for the syphilitic constitute our remedies for those cases which depend upon some fault of the system. But even with this course many patients become tired and discouraged at the delay and demand more active measures be adopted. It is then that rubbing the ends together, injections of irritants, introduction of setons, caustics, and pins, resection of the ends of the bone, bone grafting, wiring, and finally amputation of the member must be considered. One or more of these methods may be adopted. Of course, it is to be understood any faulty position must be corrected.

The history of these various procedures is entirely out of place in a practical paper, and then again you are all familiar with them. The best method, so far as my limited experience goes to show, is that of resection, resection with wiring of the freshened ends of the bone. After the operation I encourage free suppuration, believing the bony union which results will be firmer and more permanent, since, as Wyeth has written:

If the broken ends do not come in contact with the air, that is, if the fracture is not compound, the process of repair in bone after an injury is similar to the physiological process of development of this tissue, namely, the embryonic tissue is developed into cartilage cells, and these, undergoing proliferation, develop into a secondary embryonic tissue, which is formed directly into bone. If, however, air is admitted to a wound in bone, the process of ossification in the embryonic tissue is more rapid and direct, since the intermediate stage of cartilage cell formation does not occur.

Repair begins in the adult subjects generally about the tenth day. The callus is solid from the fifteenth to the thirtieth days and is absorbed by the sixtieth day.

I have seen four cases of ununited fracture during the last twenty years. In two success followed resecting the ends and wiring; one died from shock following amputation of the thigh, and the fourth would not consent to any operative treatment and has a perfect pseudarthrosis of the lower third of the thigh, without disability, but a shortening of about 2 inches.

Case 1.—B. S. P. White, adult. Was first seen and treated for secondary syphilis. Further examination revealed the presence of a pseudarthrosis of the right humerus at the upper third, of several years' duration. The arm was perfectly useless to him, hanging flail-like by his side, so when an operation looking to its improvement was proposed to him, it was gladly accepted. Under a mixed anæsthesia of chloroform and ether an incision 3 inches long was made along the outer aspect of the arm,

the bone exposed, and the ends found to be bound together with strong, fibrous bands. The fracture had been oblique. The lower end was resting high up on the upper and on the inner side. Dividing the ligamentous bands, the periosteum was pushed out of the way and the ends of the bone freshened, about half an inch being taken from each end. The freshened ends were pierced with strong silver wire and tied tightly, the ends of the bone having been brought into exact apposition and the periosteum drawn down. The wound was allowed to heal by granulation. In four weeks the bone was united, and in six months he was dismissed from treatment. At the expiration of two years the wires had worked their way to the surface and were removed, the arm at that time being strong and of equal size as the other.

Case 2.—W. H. R. White, adult. Sustained a double fracture (simple) of the right femur. After months of treatment he came under the care of one of the most distinguished surgeons in the District of Columbia in a frightfully debilitated condition. A fracture just about the junction of the middle and lower thirds and another nearly midway of the lower third allowed the intervening fragment to remain looser. After consultation wiring was considered, but the lower end of the bone was so unhealthy that amputation was done at the upper third.

Case 3.—P. M. White, aged 25 years; blacksmith, of good muscular development. History of syphilis contracted about two years previously, at which time he was circumcised under cocaine anæsthesia. Was treated at irregular intervals with the protiodide of mercury, stopping treatment when the eruption had become dried. Has been a very hard drinker of whisky for the past twelve years. On May 28, 1892, while under the influence of alcohol, he boarded the engine of an express train. After riding a few blocks, about a quarter of a mile, he jumped off, thereby sustaining a comminuted fracture of the right tibia and fibula. He was carried to hospital in the police patrol. After being made comfortable for the night, the next morning an extension apparatus with weights was applied and retained on the leg for twelve days, when a plaster of Paris bandage was substituted, the weight extension being continued. This bandage was allowed to remain on the limb for one month, when it was removed and another applied. At the end of six weeks he was allowed to get out of bed and walk about the ward on crutches. On July 26 the plaster bandage was removed, and he was discharged cured.

During his stay in hospital he was treated for syphilis with iodide of potassium. He now came under my care; he was impatient and wanted something done for him. After attempting to set up an inflammation by rubbing the fragments together, I determined upon resection and wiring. Having been given a soap bath and his leg shaved, this was done on August 5 (1892), at half past 6 o'clock in the morning, Drs. T. N. Vincent, J. V. Carrahar, and R. A. Neale assisting. The anæsthesia was begun with chloroform, but as he took it so badly ether was substituted. An incision extending downwards from the promontory of the tibia to very near the end of the bone was made. This was supplemented by a T incision over the seat of nonunion, the bones separated from their muscular attachments, and the following condition found: A fracture at the middle of the tibia, united; a fracture half an inch below this, united; a long fracture starting from the internal angle of this last fracture and extending down at an angle of 75°, united by fiber. In the lower fragments the bone had been split for an inch. The fibula had been shattered, but had united in all its fragments, with much shortening.

Each fragment of the ununited portions of the tibia was resected obliquely, 1½ inches of bone being removed; with a jeweler's drill each freshened end was perforated in two places and wire passed through the perforations, drawing the ends together; the wires were twisted, the ends pressed well down upon the bone, and the periostrum drawn over them. Eleven sutures were required to close the wound, a drainage tube introduced at the angle of the wound, and an iodoform dressing applied. The leg was then placed in a fracture box, with bran supports. Given morphia sulph. gr. ¼; reaction from the anæsthetic good; 7 p. m., temperature, 101⅕°; pulse, 120. Has vomited several times; has not eaten anything; given whiskey at intervals; pain along tibial nerve severe; morphia sulph. gr. ¼ every two hours if necessary.

August 6, 10:15 a. m. Temperature, 100⅘°; pulse, 96. Slept very little during the night, as muscular contractions were very painful and annoying; morphia sulphate gr. ¼ as necessary. .

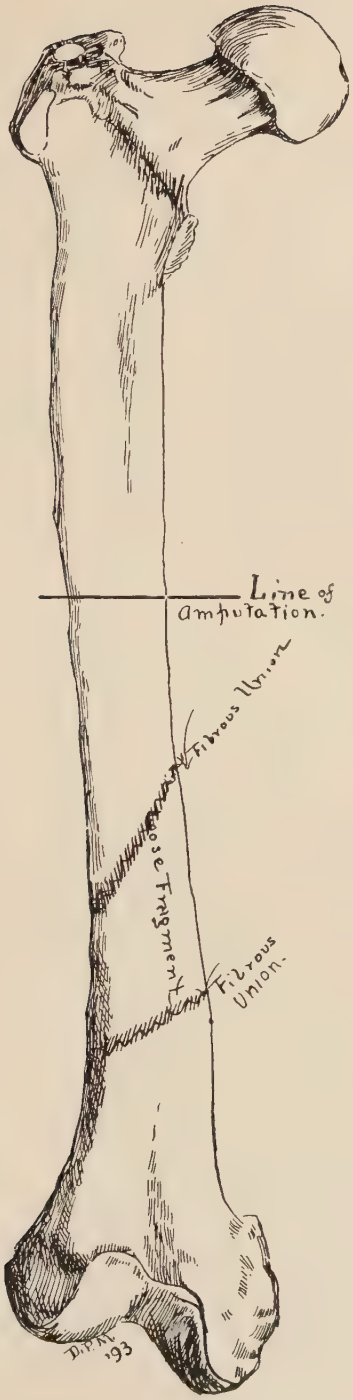
August 7, 11 a. m. Temperature, 100⅘°; pulse, 96. Slept during the night; feels comfortable; wound is discharging at angle over the wires; other parts look well; washed with a solution of carbolic acid and dressed with iodoform.

August 8, 7:30 p. m. Temperature, 102⅖°; pulse, 120. Wound at angle is discharging very freely around and through drainage tube; tube taken out; wound washed with carbolized water and dressed with iodoform; given bromide of potassium and chloral hydrate; muscular contractions not so severe; has eaten nothing since the operation; milk punch continued.

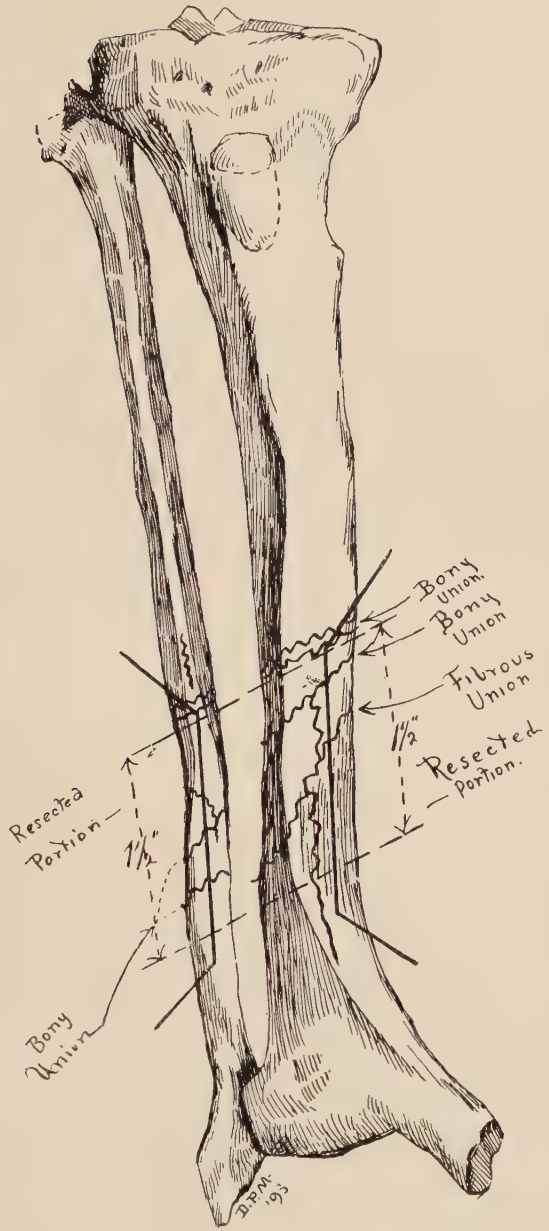
August 9, 12 m. Temperature, 100⅕°; pulse, 112. Feels comfortable; has eaten chicken broth and toasted bread; wound discharging freely.

B. S. P., ADULT. UNUNITED FRACTURE OF RIGHT HUMERUS.

Heavy black lines show wire sutures.
Broken line shows line of fracture.



W. H. R., AGED 27 YEARS. UNUNITED FRACTURE OF RIGHT FEMUR.



P. M., AGED 25 YEARS. UNUNITED FRACTURE OF RIGHT TIBIA AND FIBULA.

Irregular black lines show lines of fracture.
Heavy black lines show wire sutures.

August 10, 11 a. m. Temperature, 100°; pulse, 100. Suppuration free; has pain and jerking in leg; dressed with carbolized water and iodoform.

August 11, 12 m. Temperature, 99⅘°; pulse, 96. Suture at angle taken out to allow freer drainage; iodoform dressing; batting changed; morphia sulphate and chloral hydrate as necessary.

August 12, 11 a. m. Temperature, 100⅕°; pulse, 112. Delirious during the night; attempted to get out of bed; suppuration free; took out sutures; wound at upper portion healing, leaving the T incision open; felt bones of leg jump; sulphate of magnesia.

August 13, 12 m. Temperature, 100⅓°; pulse, 112. Slight pains in leg.

August 14, 11:15 a. m. Temperature, 99⅗°; pulse, 96. Feels comfortable; felt bones jump during the night; pads changed; suppuration free.

August 16, 10 a. m. Temperature, 99⅕°; pulse, 90. Feels well, except little sickness at stomach; bones give him the sensation he had when they were uniting; dressed with carbolized water and iodoform; laxative.

August 18. Temperature, 98⅕°; pulse, 88. Had malarial symptoms; ℞. quininæ sulph. gr. 11, every three hours.

August 22. Temperature, 98⅗°; pulse, 88. Bones uniting.

August 24. Temperature, 99⅖°; pulse, 90. Doing well; bedding changed.

September 12. Abscess at upper extremity of incision incised and a large amount of clean, healthy pus evacuated.

September 18. Doing well; no discharge; wound healed; wires can not be felt.

September 26. Put on posterior tin splint with foot piece; allowed to get out of bed and go about his room on crutches.

October 9. Dressing removed; tin splint reapplied with silicate of potash bandage; allowed to go about at will on crutches.

October 20. New silicate of potash bandage applied; can lift leg without pain or strain when no bandage is on it.

In January went to work at horseshoeing; wound up with a heavy spree and a hard fight; was thrown down and dragged about the room; felt no bad effects in the leg; union perfect.

February 16. Leg still doing well; wears the last bandage; has secondary syphilitic symptoms; given hydrarg. protiodite gr. ¼ every four hours.

February 26. Bubo incised; continue pills.

July 4. Bandage taken off; wires still in the bones; leg perfectly strong; can do as good a day's work at horseshoeing as before injury. He wears a shoe that prevents any limping.

Cases 1 and 2 prove to me syphilis is not a cause of non union, and that the bony union following free suppuration is stronger and more permanent than that following the closed method of treating these cases.

A CONTRIBUTION TO THE STUDY OF CLUBHAND.

BY REGINALD H. SAYRE, M. D.,

Orthopedic Surgeon to Bellevue Hospital, out-door department.

Congenital clubhand is a deformity of very much less frequent occurrence than clubfoot, and its cause is involved in equal obscurity.

There are clubhands of the acquired variety, caused by vicious cicatrices as a result of burns, by paralysis of certain muscles, or contraction of others from central nervous irritation, or in other cases resulting from injuries to the bones of the hand or forearm, but these do not properly come under the head of clubhand, such as I wish to mention. As examples of these acquired forms, I might mention the following cases:

In the Philadelphia Medical News, May 12, 1888, J. E. Young reports a case of clubhand, due to irritation of the brain, which disappeared on the removal of the disturbing influence. The infant was delivered by forceps after a protracted labor, and the left side of the head much crushed. A large hæmatoma formed here, and subsequently the right hand was markedly adducted, and the fingers and thumb flexed, and the hand was flexed at the wrist, forming almost a right angle with the forearm in the radio-palmar position. The muscles on the radial side of the forearm were

firm. The hæmatoma was incised, and profuse bleeding followed, and subsequently the deformity gradually subsided, disappearing twenty-four hours before death, which occurred some days later. At the autopsy a fracture of the left parietal bone was found over the position occupied by the ascending frontal and parietal convolutions, which had been subjected to great pressure from the effused blood.

Bilhaut in the Annales d'Orthopédie May, 1893, relates a case of clubhand which was supposed to be congenital, but which was really the result of a fracture of the ulna at birth, or soon after, with subsequent loss of bone from suppuration, giving rise to inequality in the length of the bones of the forearm, causing sharp deflection of the hand towards the ulnar side. For the relief of this condition the author proposes to remove a portion of the radius and so make it of equal length with the ulna.

The congenital cases of which I wish to speak are of a different kind and may be divided into three varieties. (1) Those where the skeleton is complete and well formed. (2) Where the skeleton is complete but ill formed. (3) Where the skeleton is incomplete and distorted. It is said by various writers that the majority of cases come under the the third head, but in the author's personal experience this has not been so, only two of the five cases that have fallen under his observation showing absence of portions of the skeleton; but, of course, this number is far too small to be used in drawing conclusions of any sort.

In four of these patients there was clubfoot of some variety, and in one case an hypertrophy of one great toe, and the large majority of reported cases are associated with abnormalities of development of some part of the body.

The direction of the deformity may be either in flexion or extension abduction or a combination of two, the most frequent seeming to be the radio-palmar variety.

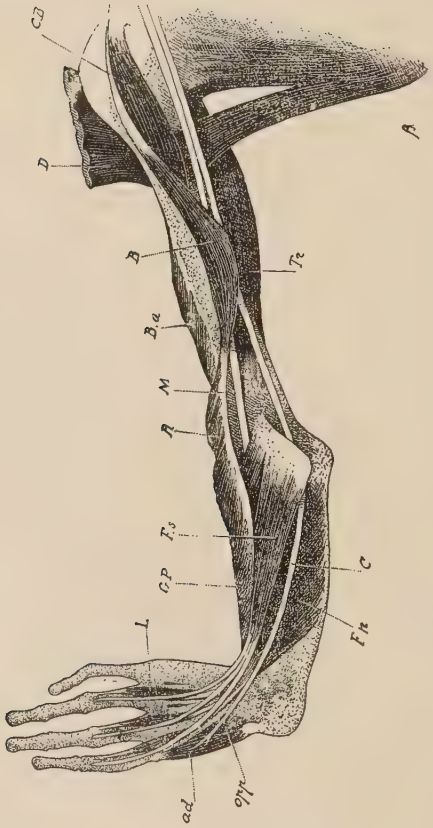
In those cases where the bones of the hand and forearm are present the prospects of a good result are more favorable than where there is absence of one or more bones. In these milder cases, when seen early, it is sometimes possible to restore the hand to proper shape and function by constant manipulation and retention of the parts in an improved position by some fixed dressing, as for instance, the plaster-of-Paris bandage, changing the dressing from time to time as the deformity is reduced. Section of the tendons or ligaments or fascia may become necessary, especially if the case is not seen in the early stages.

Many of these structures are so situated as to make open section much more preferable than the subcutaneous method, and if the flexor tendons have to be divided it would seem better to operate on the forearm instead of the hand, and to split the tendons longitudinally, and, after having gained such additional length as was needed by sliding the ends past each other, to suture them together again once more. I have seen two cases where the deformity was due to shortened flexors of the fingers, one of which had been operated on in Baltimore by the section of the flexor Carpi radialis and flexor Carpi ulnaris with great improvement as to function according to the statement of the parents, but the hand was much distorted, and the fingers could be extended only when the wrist was flexed sharply on the forearm. In this case the parents were obliged to leave town before any operation was practicable; and in a second of similar, though less aggravated, character the presence of inflammation of the cervical vertebræ made it inexpedient to give an anaesthetic, and the operation was therefore postponed.

In a double congenital clubhand at present under treatment the position has been very markedly improved by manipulation and plaster-of-Paris bandages, as seen by the accompanying photographs.

Another case of the more aggravated kind has also come under my observation, and these are sufficiently rare to warrant me in describing it at length:

R. B., æt. 9, was seen by me in December, 1892, having a congenital clubhand and clubfoot of the right side, and also a lateral curvature of the spine, the concavity being on the right side. The lateral curvature was apparently due to the imperfect development of the whole right half of the body, the right upper and lower extremities both being markedly smaller than their fellows. This might possibly be



CLUBHAND DESCRIBED BY KIRMISSON AND LONGUET. REVUE D'ORTHOPEDIE, JANUARY, 1893.

accounted for by disuse, as, on account of the very severe form of clubhand and clubfoot, the boy had depended almost altogether on the left half of his body for assistance. The clubfoot was an extreme varo-equinus, and was treated by deep subcutaneous incision in the sole of the foot and tenotomy of the tendo achillis, the foot then being immediately replaced in the normal position by means of Bradford's clubfoot twister, it being necessary to employ a very considerable amount of force to effect reduction. The foot was then kept in position by plaster-of-Paris boots, renewed about every three weeks until at the present time his foot is practically in a normal shape.

The clubhand was almost the counterpart of one described by Kirmisson and Longuet in the Revue d'Orthopedie, January, 1893, and which they had an opportunity to dissect. The radius and thumb were absent as well as the first metacarpal bone and a certain number of the carpal bones. Exactly which of the latter were absent, I am unable to state. The ulna was curved in its middle at an angle of about 30° toward the side where the radius should have been. The hand was almost at right angles with the forearm, but toward the radial side and flexed on the forearm. The carpus did not articulate with the ulna, but was attached to it by means of firm, ligamentous bands.

I first did an osteotomy of the ulna to correct the curve, and, after the bone had firmly united in a straight line, endeavored to stretch the contracted tissues on the side of the arm, where the radius should have existed, by means of adhesive plaster, attached above and below the wrist, and passing around the ends of a wooden splint, which was fastened to the forearm.

After several weeks of traction the hand could not be drawn down far enough to permit the ulna to slide above the carpus, although a considerable elongation of the contracted tissues had been effected. It had been my intention to endeavor to form an artificial joint between the lower end of the ulna and the carpus, but on cutting down upon the bones I found that after freeing the end of the ulna from all ligamentous attachments, it was impossible to draw the carpus clear of it, and I therefore removed what I took to be the os magnum and unciform.

The scaphoid and semilunar apparently did not exist, as in the case which Kirmisson and Longuet describe. The tip of the styloid process of the ulna was then cut off, and the end of the bone inserted into the gap in the carpus formed by the removal of the carpal bones. I had originally intended to wire the bones fast in this position, but on second thought determined to leave the ulna free, thinking that a more serviceable hand would result from this method, and that the bones could be wired together later on, if necessary. This operation, of course, shortened the upper extremity still more than nature had already done, but it seemed to me wiser than the very extensive division of tendons and muscles which would have been required in order to permit the carpus to be pulled down to the extremity of the ulna. The hand was dressed in a straight position, and, after about three weeks, movements of the wrist were made, with the object of creating, if possible, a serviceable joint, which should be under the control of the patient.

The position of his hand before and after the operation is shown in the accompanying photographs, and the boy's control of his motions and his ability to grasp objects is greater now than it was before the operation, while his appearance is vastly improved. He is still wearing an apparatus with a joint at the wrist, allowing flexion and extension, while retaining the bones in a better position than they assume when left to themselves.

In the case described by Kirmisson and Longuet the shape, general appearance, and situation of the defective bones correspond so closely with the case I have just narrated, that I think it worth while to quote quite largely from their description of the autopsy:

Muscles—Arm.—At the upper end there was a complete absence of the long portion of the biceps; the short portion seemed to be normal. At the lower end the tendon which is inserted into the bicipital tuberosity was absent, and the biceps was gradually merged into a rectangular muscular fasiculus in front of the elbow joint. The brachialis anticus was remarkably small. The other muscles of the arm were

normal, but were very slightly developed. On the anterior surface of the forearm the muscular anomalies were so marked as to render it difficult to recognize what muscles were present. There was no pronator radii teres. On the inner border there was a muscular fasiculus continuous with the rectangular muscular mass spoken of above, which below spread itself out at the edge of the carpus, and seemed to correspond to the palmaris longus. The flexor carpi ulnaris was absent. The superficial and deep flexors were in a confused group at their upper extremities, and it was impossible to separate the one from the other at their lower insertions in each of the three last fingers, counting from the ulnar side of the hand. There was no flexor tendon going to the atrophied finger which corresponded to the index; there was no flexor proprius pollicis nor pronator quadratus. On the posterior surface of the forearm the supinator longus and brevis were absent. An undetermined little muscle which was confused with the other muscles of the posterior surface of the forearm was inserted toward the external part of the carpus, and represented the radial group. A little muscle fiber ran from the epitrochlear fossa to the internal edge of the carpus. There was no anconeus, and no extensor minimi digiti. A single muscle fiber went to the ulnar side of the second finger, representing the extensor communis digitorum.

Hand.—On the outer border of the hand there were no muscles to form the thenar eminence; three lumbricals were present; there were no interossei.

Nerves.—The median nerve was normal. The ulnar passed the elbow in the usual position, and was lost on the inner side of the hand. The radial sprang from a common trunk with the musculo-spiral and was lost on the forearm.

Skeleton.—The scapula and clavicle were well formed. The humerus had no bicipital groove. The musculo-spiral groove was normal. The elbow joint was very much relaxed, only the trochlear surface of the humerus was covered with cartilage. The sigmoid cavity of the ulna was well shaped, but allowed only slight movement of flexion and extension of the elbow joint. There was a very sharp anterior curve in the ulna which made the styloid process very prominent. The radius was absent. The carpus consisted of five bones, two of the first row, the cuneiform and pisiform, and three of the second row, the trapezoid, os magnum, and unciform. The scaphoid, semilunar, and trapezius were absent. The two internal metacarpals were also absent; the other respective phalanges were normal, but the index and the second metacarpal which it supported were very short. There was no thumb.

The most extensive article on the subject is that of Bouvier in the Dictionnaire Encyclopédique, in which are arranged in tables all the cases reported up to 1871. Of the dissections of several cases he gives minute details and also illustrations of the anomalies which correspond very closely to the defects in development found in the present case. In regard to treatment, but little is said except that stretching and tenotomy are useful in certain cases, and may be supplemented by apparatus. LeDentu in the Dictionaire de Jacoud also enters largely into the description of this affection, but says little as to treatment. Bradford and Lovett, after mentioning the different positions in which the hand may be found, say in regard to treatment, that in the worst cases where there is much bony deficiency the choice lies between amputation and doing nothing. In the milder cases of resistant muscles, stretching by manipulation and apparatus may be efficacious. In general, the treatment must be varied according to the severity of the case.

St. Germain divides clubhand into three groups similar to those I have mentioned above. Three such cases are in the Dupuytren Museum, and are mentioned by Malgaigne in his "Lessons on Orthopedic Surgery." He suggests manipulation and the employment of apparatus to remedy the deformity. Redard recommends manipulation and massage in young children where there is but slight fibrous or tendonous resistance; tenotomy is to be done only on the flexor carpi radialis, ulnaris, and palmaris. He does not think very highly of the various orthopedic appliances, and believes that resection and arthodesis are very rarely indicated.

Hoffa goes quite extensively into the various varieties of faulty development of the upper extremity which may give rise to clubhand. That due to absence of the ulnar is very rare, Burckhart and Birnbacher having been able to find only seven reported cases. In regard to treatment, Hoffa mentions massage and retention by means of apparatus but gives almost no details, while Holmes and Owen are equally brief in their remarks on this point.

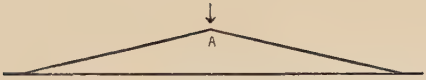


Fig. 1.

Fig. 2.

Fig. 4.

Fig. 3.

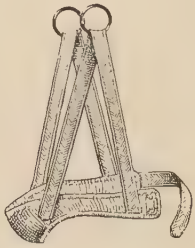


Fig. 5.

Fig. 6.

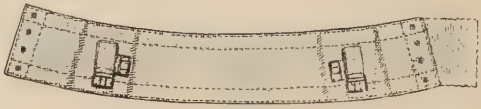


Fig. 7.

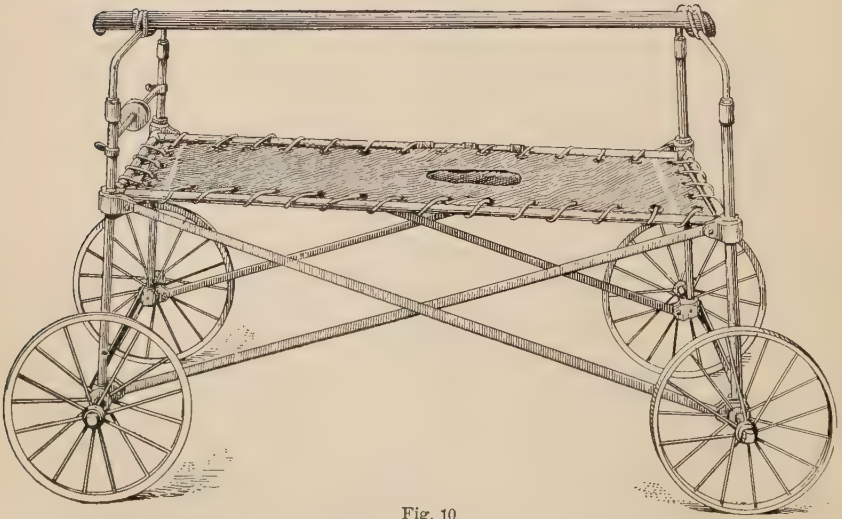


Fig. 10.

TREATMENT OF POTT'S DISEASE.

The operation which I practiced on the case just mentioned is, as far as I have been able to review the literature of the subject, the first of the kind yet described.

The ulna does not stay in its place as well as I should wish, and if I were to operate on a second similar case I should endeavor to remove the carpal bones without severing the posterior ligaments and so leave a pocket into which the end of the ulna might be placed, and I may still perform some such operation on this boy if his hand does not seem sufficiently useful.

In a case described by Bouvier, which is in the Dupuytren Museum, such of the carpus as is present articulates with the ulna on the side where the radius should have been, the radius being absent. In such a case the proper operation would seem to be the division of the ulna just above the articulation with the carpus and to turn it at right angles, letting the outer surface reunite with the cut end of the ulna, and thus bring the hand into a straight line with the arm, at the same time preserving the wrist joint.

The anatomical peculiarities of these cases are such that each must be judged by itself, and this brief sketch of the subject is simply offered as contributing to the scant literature of a subject on which much may still be said.

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RECUMBENCY IN THE TREATMENT OF POTT'S DISEASE.

By JOHN C. SCHAPPS, M. D., Brooklyn, N. Y.

The collapse of a cavity resulting from disintegration of bone and fibro-cartilage is not the only local element of the spinal deformity of Pott's disease. During the process of destruction, the bone for some distance around that which breaks down becomes greatly softened. This change is not to be regarded as merely a part of the destructive process, but, as a great degree of protection against mechanical violence is thus afforded, it has a positive conservative value. The protection thus gained, however, is liable to be at the expense of change in shape of the softened bone itself, and it is this also and not the bone destruction alone which produces the deformity. In those cases which have no very acute symptoms, such as pain, night cries, marked spasm, fever, or impairment of general condition, but with a prolonged tendency to progressive deformity, it is probably the predominating factor. It has been shown that after removal of a tuberculous focus from the bones entering into the knee joint the surrounding cancellous tissue remains for some months in a pliable state, so that without renewal of the ostitis it may bend and permit flexion of the limb; that this is corrigible by mechanical means and that the bone ultimately becomes permanently hard.*

* Deformity following excision of the knee; Trans. Am. Orth. Ass., Vol. v, Brooklyn Med. Journal, February, 1892.

The same conditions obtain in disease of the cancellous tissue of the spine, and after the destructive process has expended its energy the deformity may still be easily increased, but is also to a great extent controllable. Given a soft segment in the vertebral column, the kyphos is the mechanical result of weight and muscular action exerted in one or more of the following ways: First, as longitudinal pressure by which the part is squeezed out; second, as anterior leverage by which it is bent out; third, as direct backward pressure, such as intra-abdominal or intra-thoracic tension, or in case of a patient supine upon a yielding surface, visceral weight, pushing out a weak portion of the parieties. It is of importance that these deforming forces be kept clearly in mind in order that counteracting force may be intelligently applied. Sudden, intermittent pressure, such as is produced by jars or twists, favor more particularly the destructive process; while long-continued pressure produces more effect in changing the shape of the surrounding bone. The same force may be actively destructive or passively deforming according as the active or passive condition of the parts predominates. Cicatrical contraction also plays an important rôle. Although conspicuous as a distorting factor in disease of joints other than spinal, its existence in this connection seems to have been generally ignored. An amount of cicatrization sufficient for the firm binding together of the parts adjacent to the bony defect is conservative, and it is fortunately improbable that any force which we can bring to bear can overcome it. But here, as elsewhere, inadequate protection in the acute stage may permit such a degree of disease intensity as will result in the formation of an unnecessarily large amount of scar tissue. This in contracting increases the deformity.

It is evident that inhibition of the destructive process is the most efficient preventive of the deformity, but as the latter is not necessarily proportionate to the former, and as the displacement of parts is itself traumatic in its effect, the deformity is treated not only for itself, but because it has a marked influence upon the causative destruction and upon the general health of the patient. In any stage of the disease the mechanical treatment consists in protection from traumatism, intrinsic and extrinsic, and antagonism of the deforming forces enumerated. But while no sharp distinction in kind is to be made between therapeutics of the disease and those of the deformity, there is a very great difference between the degree of protection and of mechanical prophylaxis that is necessary for a spine in which progressive caries is in operation or very great softening exists, and that degree which will meet all the needs of one where that process having ceased to operate, only a moderately weak place remains. Clinically accurate determination is impossible, and the treatment must be made thorough enough for any possible state. If the conditions of the spondylitic spine, when upright, and the active, unavoidable performance of its functions as a support and a base for muscular action, and subject to a constant succession of traumatisms—accidental, those involved in the use of the limbs and those consequent upon misplaced muscular origins and insertions—are considered, the magnitude of the demand made upon any form of portative apparatus is apparent. Such instruments have demonstrated a great degree of utility. Let us consider their limitations.

Their action consists in support (principally antero-posterior) by leverage, and in longitudinal traction. Unlike splints applied to a broken long bone or to a joint of a limb, where they act on long, stiff levers, they have no direct grasp upon the seat of disease nor upon the parts immediately adjacent thereto, but their power is diminished by the distance and the heterogenous character and mobility of the parts which intervene between their points of application and the spine; and in the acute stage the force thus applied is expended not altogether upon the bony defect or the seat of actual disintegration, but to a great extent upon the soft mass surrounding it. This can not be pried straight while it is under the influence of pressure transmitted longitudinally through the spine. Their antero-posterior support is also limited, in mid-dorsal disease, for instance, where the length of the spine above and below

furnishes the best opportunity for leverage, by the amount of pressure which the skin over the kyphos will bear. In acute cases it frequently happens that this tolerance is not sufficient to permit a successful resistance to destructive and deforming force. As the back becomes sore the apparatus must be removed or modified to diminish the pressure. This is but following up an increasing deformity, not successfully antagonizing it. In disease of the upper spine, where traction is the more essential element, similar limits are encountered. The immature pelvis of a child affords a poor base for traction. The skin covering the chin, back of the head, etc., will permit far less pressure than is involved in the weight of the head alone.

Another indication of inefficiency of portative apparatus is furnished by the convalescent spine. In the acute stage the area of reflex muscular spasm extends much beyond that of the disease. The extent of this rigidity is a pretty fair criterion of the intensity of the process. Frequently the whole spine is rigid or may become so when the patient stands. In a case of dorsal disease a posterior brace fitted to a prone patient will either continue to fit when the patient stands or will cease to fit because he straightens his lumbar spine. But when the acuteness diminishes the area of previous collateral rigidity becomes more flexible and a brace now fitted to a prone patient does not follow the contour of the upright spine. The tendency of the healthy spine when vertical is to sag into curves, and the patient now lordoses away from the brace. Although some support had been afforded, it had not been sufficient to supplant reflex muscular spasm. It was the patient's muscles, to some extent at least, and not the brace that had held him up. In many cases the patient has supported the brace more than the brace has supported the patient. These criticisms are applicable to any form of portative apparatus of whatever material constructed. Their use belongs properly to the subacute or convalescent stage only.

Recumbency as a therapeutic measure means mechanically more than simply putting a patient to bed. It implies protection from traumatism and retention of the whole spine in the best possible position, so that the relations of the separate parts remain unchanged or subject to those changes only which by the use of pressure and traction the surgeon may make. The prone position is preferred by some surgeons, notably by Noble Smith,* of London, for the following reasons: (1) It removes the weight of the body from resting on the spine; (2) it restrains the action of the abdominal and other muscles in front of the spine, so that the part of the body above the deformity is not bent forward; (3) it allows free use of the arms for feeding, play, etc., without causing the body to bend forward and press the diseased bones together. I have had no experience with this position, but, as compared with the supine, it would seem to be open from a purely mechanical standpoint to these objections: (1) It fails to afford the splintage which, in the supine position, the contact of the spine with the fixed surface of the couch affords. On the contrary, the anterior chest and abdominal walls being stationary all the traumatisms of respiration and other thoracic or abdominal movements are effective on the vertebræ; (2) deglutition, especially of liquids, and attention to the other needs of the body must be much more difficult in the prone than in supine position; (3) in cases where it is necessary to keep the head fixed in line with the trunk, the patient could not see what is going on, and confinement in this position would soon become very irksome; (4) suppose the apex of the kyphos to be designated by a and a' in the accompanying diagrams, the direction of gravity being indicated by the arrows.

In the prone position (fig. 1) such of the parts as underlie the kyphos are supported by the bed, and are themselves supporting the spine in its deformed position; there is nothing to prevent the soft bone from being thrust out. In the supine position (fig. 2) the trunk rests, in part at least, upon a, and the weight of the spine above and below the kyphos, together with that of the superincumbent parts, is reforming in its tendency.

That this last consideration is not a mere matter of theory the accompanying

* The Surgery of Deformities. E. Noble Smith .London, 1882, p. 218.

tracings (fig. 3), taken from a case of dorsal disease, will very strikingly show. The first (*a*) was made by means of the lead strip applied to the spine while the patient was prone. The patient could by no means have tolerated in the upright position a brace that would have produced such a change. When cut out of cardboard the edge fitted the spine accurately. The second (*b*) was thus obtained: Several thicknesses of plaster-of-Paris bandage were applied to the mid-line of the back and closely secured by a muslin bandage. The patient was placed in the supine position upon a firmly-padded table and kept quiet until the plaster had become hard. The muslin bandage was cut away, and the patient lifted carefully out of the cast. By means of the lead applied to the impression the contour of the cast was obtained, cut out of cardboard, and tested. These tracings have been placed together for comparison. While the general straightening of the spine is in part due to compensatory lordoses above and below the kyphos, even this change is a very desirable one. For, as emphasized by Whitman,* the spinal deformity derives its importance chiefly from the resulting misplacement of the head, shoulders, chest, etc. The lordoses must moreover exert a considerable straightening force upon the kyphos. (*f*) In a similar case were determined in both positions the transverse outlines of the projection. Fig. 4 shows the comparison. The upper is the profile in the supine, the lower that in the prone, position. The greater forward inclination of the ribs in the prone position is serious, because it effects a projection forward of their sternal ends, and thus causes the characteristic pigeon breast.

The thorough support of the spine is not possible if the patient lies upon a soft or yielding material, or upon a canvas-covered frame placed upon a bed from which it is raised several times daily. For the contour of the spine is not the same when the frame is suspended as when it is on the bed. Although no pain may be caused by thus changing the relations of the inflamed or softened vertebræ, such change tends to produce reflex spasm and is not surgical. The supporting surface should be quite firm, and the whole spine should be comfortably fitted. When the posterior projections of the occiput and the buttocks are greater than that of the kyphos, a pad, tightly stuffed with curled hair, cork shavings, hair felt, or similar firm elastic material, should be placed under the latter. The hollows of the cervical and lumbar regions should also be filled in when they exist. On the other hand, care should be taken that the kyphos does not bury itself in the bed so that the pressure above and below, or upon the ribs at either side, is greater than at the apex. The backward projection of the diseased area should be at all times directly antagonized by as much force as is practicable. It is essential that this force be subject to accurate adjustment without exciting reflex muscular spasm by interrupting the general condition of rest. This adjustment is not possible when the patient lies upon a board or other surface where no access is had to the spine. It is then due to slight deformity, and good fortune if he does not have to be repeatedly taken up and the padding modified to meet the changing contour or to relieve some part of too concentrated pressure. Comfort is an essential criterion, and the same rule that applies to almost any kind of orthopedic instrument holds good here. When it is a source of pain or discomfort, it is not only not doing good, but is probably doing harm. Bathing, not rubbing, the skin with alcohol and water, equal parts, and the application of talcum, fuller's earth, or a similar drying powder, is very necessary when sores form or are imminent. A very little turning of the patient will suffice for this purpose, but even this should by a careful adjustment of the pressure be avoided as much as possible, and should always be done by two persons, one at the head and shoulders, the other at the pelvis, working together so as to keep the relations of the parts unchanged. This is particularly necessary in cervical disease. In these cases, the patient will not, usually, try to turn his head or lift it up.

Traction is particularly efficacious in cervical or high dorsal disease and usually may be applied by means of a head sling similar to that employed in the Sayre suspen-

* Trans. Am. Orth. Ass., Vol. v., 1892.

sion apparatus, fig. 5. To the rings of this are attached a stout cord, which passes over a pulley and is fastened to a weight. It is well to have several of these slings, made of drilling and lined with Canton flannel, or made altogether of the latter, and with straps of webbing instead of leather. They can be washed when soiled and are more comfortable. Fig. 6 shows a form of headpiece, which is easily made, and answers very well in cases when a light weight is to be used and the occipital projection is well developed, and it has the merit of not interfering with the lower jaw. It consists simply of a piece of webbing 1 inch wide, a buckle, and two 1½-inch iron harness rings. So long as the weight is pulling the web has a good hold. After the ring has adjusted itself the two layers of webbing are to be stitched together when they cross. I sometimes add a strap to pass from ring to ring under the chin. It can be removed so that the patient may eat, without entirely intermitting the traction. As compared with the other headpiece this one has the disadvantage that the patient can slip it off when the nurse is not looking. When the case is acute, however, he is not likely to do so. The feet are placed from 1½ to 4 inches lower than the head, so that the greater mass of the trunk and lower extremities affords a good base for counter traction. The amount of weight is to be regulated by the patient's feelings. From one-half to 4 pounds in case of a young child is sufficient to counteract muscular spasm and render the patient comfortable. In mid and lower dorsal disease traction is not so efficient. The patient should be nearly or quite horizontal, because the amount of pressure involved in drawing the upper segment of the trunk up hill is greater than the chin and scalp will long stand.

In these cases, if attempt at much traction is made, the pelvis should be secured by adhesive plaster applied to both lower extremities, as for hip disease, or by the belt shown in fig. 7, laced on, with straps passing to the foot of the bed. But, as stated, the undeveloped pelvis of a child offers very poor opportunities for traction. The belt is of more service in securing the pelvis so that the patient can not turn over. While the amount of weight should be all that can be tolerated, it is evident that the leverage illustrated in fig. 2 is a more powerful agent than traction in these most formidable cases. In lumbar disease the head should be placed a little lower than the feet. The pelvis is to be fixed as before, and the extending force consists of the head and thorax, with as much additional weight as is comfortable. When psoas contraction exists, an adjustable inclined plane is used, with traction on the flexed limb.

At the annual meeting of the American Orthopedic Association, held in New York September, 1892, I presented an orthopedic couch, which seemed to be all that was necessary for its purpose. Further experience has demonstrated its inadequacy, and impelled me to make experiments in devising a bed which will more fully meet the requirements already outlined. The surgical cot apparatus which I now present comprises a modification of the familiar canvas-covered frame, with provision for supporting it and maintaining uninterruptedly rest, fixation, and accurately adjusted pressure and traction. It consists of a rectangular frame of iron, a canvas bottom, and an iron support, upon which the frame is adjustable at any convenient height or incline. The rectangular frame is stiff enough to stand, without bending, the patient's weight and the strain involved in stretching tightly a heavy canvas.

It should be from 4 to 6 inches longer than the patient—48 by 15 inches inside will be found a convenient size for children under 5 years old—and it should be made of three-eighth inch pipe. Larger sizes should be made heavier. The canvas should be No. 2 for sizes under 48 inches, thicker for larger sizes. It is to be hemmed and made a little shorter and narrower than the frame to allow for stretching, and provided with eyelets through which pass stout cords by which it is laced to the frame. The lacing is to be done secundum artem. The corners are first drawn as tightly as possible and the sides and ends laced by separate cords. The object of this is to provide for the independent adjustment of each part and so to diminish the sagging. Warming the canvas will assist in getting it tight. A hole, preferably a narrow oval, is provided for the purposes of micturition and defecation. It should

measure for a child under 5 years of age 6 by 3½ inches. Its long diameter coincides with the longitudinal median line of the canvas, and the center should, when the spine has not been shortened, be about three-fifths distant from the top. When the spine has been much shortened special canvas will have to be made. The edges of the opening must be strongly and neatly bound and hammered flat. The vessel is placed underneath, supported at the proper height by a stool, box, pile of books, or in some such way. It is brought to the patient and not the patient to the vessel. The opening is closed by an underflap a little broader than the hole is long. One end of it is sewed to the edge of the canvas and the other secured by three or more stout straps arranged to buckle around the side of the frame.

The patient is laid upon the couch in the position he is to occupy, so that the anus is placed at the upper end of the opening. The locations of the neck and axillæ are marked upon the canvas, and marks are also made by means of which the situation of the kyphos can be determined. He is then removed. Padded straps of webbing arranged to pass around the shoulders and through the axillæ, and provided with buckles, are sewn to the canvas. The buckles should be placed close to the sides of the neck, where they will be least accessible to the patient, and the straps diverge. The sewing can best be done with a sailor's palm and needle. A strap to lie loosely across the chest, and having in each end a loop, through which the shoulder strap passes, will prevent the slipping off of the latter. If the case be one of cervical or high dorsal disease, loose pads of kersey, hair felt, or some similar elastic material, covered with linen, can be easily placed under the neck. But for lower spondylitis the pads should be sewn to the canvas. They should be about 6 inches wide and one-half to three-fourths of an inch thick, except at the ends, where they are flattened, long enough to extend an inch or two above and below the projection. They are placed longitudinally, each side of the middle, so that a groove about one-half to three fourths of an inch wide exists between them. The object is to press upon each side of the prominent spines, and to protect the bony projection. The patient is replaced upon the canvas and the shoulders secured by the straps. To exert a pressure upon the kyphos in such a way that it may be accurately regulated, there is the following arrangement. Two, three, or more straps of webbing are placed side by side, transversely under the canvas and across the kyphos, so as to buckle, at each end, around the iron frame.

By the use of these straps, which constitute a most important feature of the apparatus, the reforming pressure is always under control, while the weights of the parts anatomically above and below are brought into play to secure a backward leverage. The cervical and lumbar hollows should be filled by small pads without groove, sewn on. The sagging of the canvas results in the formation of a shallow trough which interferes with lateral motion, and, as the material yields to the warmth and pressure of the prominent parts, after a few days the back is generally accurately fitted. By feeling the underside of the canvas it may be ascertained whether such is the case. The weight of the body serves to maintain a close contact with the couch. The most perfect fixation of the spine is secured by the application to the back of some rigid material, but this involves the danger of pressure sores, or, to prevent them, a frequent removal and reapplication of the apparatus. Thus the patient must be frequently turned over. In most if not all cases, sufficient fixation is attained by fastening the patient to the couch by means of the shoulder straps, by webbing passed around the side bar and buckled to the pelvic belt, and by the use of traction. A pillow should be put under the lower extremities to prevent pressure on the heels and also to relax the flexors. A towel fastened around the rectangular frame and the thighs prevents the patient kicking. The covering is also wrapped around the patient and frame and so keeps the back warm.

For the purpose of applying traction, there is a broad-flanged wooden pulley, which turns on a steel bar placed across either end of the apparatus at any convenient height. The cord connecting the head sling and the weight is passed two or three

times around this drum and so can not be thrown off. Should the patient move his head laterally, as may be allowed in convalescent cases, the pulley and weight follow the movement. I have sometimes secured the headpiece to the top of the frame and allowed the weight of the parts below the disease to act as the tracting force. Steel, of St. Louis,* fastens the side rings of the headpiece to uprights placed at a considerable distance apart in the head of the frame which he employs, and thus secures some lateral fixation of the head. By the use of the cot I have been able to keep up an absolutely uninterrupted rest with traction, and render the patient perfectly comfortable for months at a time. The addition of rubber-tired wheels and a parasol, has contributed to the comfort of the patient and the convenience of the friends (fig. 9).

The apparatus may be folded into a comparatively small compass. It is made by W. F. Ford, of New York, in sizes up to 4½ feet (large cot).

When the patient is recumbent, all the indications may be more perfectly met than in any other position. The force of gravity which by leverage and by longitudinal pressure acts upon the upright spine as a powerful destructive and deforming agent can now be converted into a reforming force. Direct backward pressure can be accurately antagonized. Muscular action and interosseous pressure, now greatly reduced by the general condition of inactivity, can be counteracted by fixation and by far less traction than would be required to raise the weight of what were superincumbent parts. The spine, relieved of the performance of all its active functions and saved from all traumatisms except that of respiration, is thus placed in the best possible condition for repair. And, what is of great importance, fever and the drain of muscular spasm, pain, and perverted nutrition are met by a state of systemic rest. It is true that while a gain in weight is the rule, the muscles soon become soft, and a loss of muscular strength may occur. This loss is a gain, for, to the spondylitic spine, muscular strength is a menace. So long as the nerve connections are preserved the muscle remains capable of restoration and no permanent damage by rest is possible. Nature never makes the mistake of demanding as a condition of recovery the use of any parts (as in this case bones and muscles) which are unable to perform their functions.

A feature about this measure in chronic bone disease which is surprising to all to whom it is not familiar, is the way patients thrive under it. When the fixation and traction are efficient, they are relieved of pain, sleep well, and soon loose the drawn, old, tired expression so familiar upon the faces of those suffering from the great drain of prolonged muscular spasm. I believe that the amount of caries is thus limited; that much deformity is prevented, and that the duration of the disease is materially shortened. Another merit of this therapeutic measure is that its employment does not demand the exercise of the mechanical skill and experience which is necessary to the successful employment of a portative apparatus. In places where a spinal support can not be readily obtained, recumbency with adjustable pressure and traction may be adopted until other arrangements can be made. Patients may, if necessary, be moved long distances, and with safety and comfort upon a frame.

Recumbency is indicated as a routine treatment as soon as a diagnosis of spondylitis has been made or even when it is probable. For the intrinsic tendency of the disease to progress is in each new case such an unknown quantity that no time should be expended during the developmental stage in experimenting with less thorough methods of treatment. In the case of a patient wearing a support, progressive deformity or the persistence of pressure sores should be regarded as demanding recumbency. It is of course presumed that the brace has been skillfully designed and applied, that pressure has been diffused over as much surface as the case will permit, and that by cleanliness and dryness every care has been taken to protect the skin.

* The Medical Fortnightly, St. Louis, February 1, 1891.

While no method can claim to prevent in all cases an increase of deformity, such increase should, in no case, be regarded as inevitable until it is ascertained what can be done by the careful use of mechanical force applied to the passive horizontal spine. Marked psoas rigidity denotes a considerable activity of the disease and probable abscess. When the patient walks or stands with the thighs flexed, the forward inclination of the trunk causes the weight of the mass above to act at a great mechanical advantage in the production of deformity. Support is thus made very difficult and uncertain, and femoral movement exerts through the shortened muscle a direct traumatism upon the diseased spine. These cases should be treated in the horizontal position, and the limb elevated upon an incline plane sufficiently to relax the psoas muscle. By means of adhesive plaster a weight is attached to the limb and traction made as in hip disease. As the muscle relaxes the plane is to be lowered. Pott's paralysis, even a slight dragging with exaggerated reflex, should be regarded as unequivocal indications for recumbency with all possible traction. Very brilliant results, even when there were present incontinence of urine and fæces and large bedsores, have thus been obtained. Patients with abscess should generally be treated in the horizontal position; always, if the abscess is new or increasing. Night cries, a grunting respiration, peripheral pain, referable to the spinal nerves coming from the seat of the disease, an inclination of the patient to lean on chairs, etc., indicate an insufficient support, and suggests the need of recumbency.

It is evident, however, that confinement to a cot can not be continued during the whole course of a spondylitis, nor is this necessary. When, by the absence of pain, fever, and progressive deformity, we are led to conclude that the acute or actively destructive stage of the disease has passed, the patient may gradually be allowed more freedom under the protection of a portative apparatus carefully adapted to the needs of the case. This is always done tentatively with watchful supervision, and the slightest increase of deformity or occurrence of pain, irritability, or the evidence by face, attitude, or gait that the patient is not getting the proper support should be the indication for a return to the horizontal position. This holds good for any time in the course of the disease, and any intercurrent change which makes it doubtful whether the case is doing as well as it should may be regarded as an indication for recumbency.

I trust that this cot, aside from its employment in Pott's disease, may be found of service in other cases, surgical or medical, when prolonged rest is necessary. It is adapted to the treatment of rhachitic curvature. For hip disease with flexion the inclined plane may be used as in psoas contraction from spondilytis. In fracture of the femur the railroad splint may be employed. It should extend well up to the buttock and is a very perfect means of preventing eversion. The tops of the uprights at what might be termed the head and foot of the couch may be joined by movable steel rods adjustable to any height. Across these may be placed longitudinally, like a ridgepole, a bar. This is placed over the middle, or at either side, and is intended to support by slinging an arm or leg. The ridgepole may be used to support mosquito net. It is not recommended in spinal diseases, as the patient may try to raise himself by it. A tray is easily added, or a light sewing table may be placed over the patient. I think by the use of this couch, which does not occupy much more floor space than the patient, a helpless child or young person may be quite easily handled, and by the addition of rubber-covered wheels may be readily moved about the room, placed by a window, or taken out into the sunlight and fresh air. The invalid's world would be thus greatly enlarged. When the opening in the canvas is not to be used, the water or air bed or any kind of mattress may be employed, or the canvas may be replaced by iron springs. When the crosspieces and ridgepole are taken off and the uprights folded down the couch may be converted into a stretcher with or without wheels, or the rectangular iron frame alone may be so used. The whole apparatus folds into quite a compact package, and is as light as is consistent with safety.

A BRIEF SPLINT-TECHNOLOGY FOR SURGEONS.

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The objects of this paper are to treat in detail of a new material and method devised for surgical splint-making, to aid the surgeon to become the maker of suitable splints for cases occurring in practice, and to indicate lines of procedure in apparatus-making which promise rich results in general and orthopœdic surgery.

THE MATERIAL.

The basis of the material employed is wood-pulp, made preferably from the crushed fiber of the poplar tree, and rolled in such fashion that the broken fibers intertwine in every direction and loosely, so that an increase of ductility is thus given to the product. These sheets are further strengthened by having a fabric introduced between the layers of the pulp, or by interweaving with the short crushed wood fiber a long jute or other tough fiber.

The sheets are rolled of different thicknesses, for adaptability to all splint conditions. For convenience sake I shall designate the thickness by number, each unit representing a thickness of 1 millimeter. Thus sheet 1 represents the material with a thickness of 1 millimeter, sheet 2 with a thickness of 2 millimeters, and so on.

The material, its characteristics.—The chief characteristics of this material are stiffness or rigidity when dry, and plasticity when moist. Its rigidity can be ncreased *ad libitum* by the use of a silicate solution as a moistener.

Its plasticity has a limit. The limit is rarely felt and only when molding the material over complex curved surfaces. To exemplify: A splint can not be directly molded over the ankle joint anteriorly, for there are two large curves in opposite directions to be followed simultaneously, the convex curve from maleolus to maleolus, and the concave from above downward over the leg and instep. This difficulty, when met, can be obviated in various ways. I shall mention three of them. Take the case of the ankle joint. An anterior splint is required for it. The proper shaped blank should be cut from sheet No. 2 and moistened with one of the solutions described later. It should be then applied to the limb, care being taken to keep its outer border in contact with the skin, while the superfluous material over the anterior of the joint should be pinched between the thumb and forefinger, and all of it laid or pressed over to one side; a bandage should be snugly applied to perfect the molding of the splint. This method of "pinching and folding over" has an important application in the making of spinal jackets.

A second way consists in cutting away the superfluous material, in this case an elliptical figure, and bringing the edges of the cut portion together, to retain them so by means of a strip of the material pasted over the cut edges.

A third method is to cut a blank for each important curve and after molding to properly unite them.

The material possesses, besides the above characteristics, that desideratum of a splint material, extreme lightness. Its cheapness also deserves a passing mention.

MOISTENERS.

Water or a stiffening solution can be used to moisten the material.

Water.—The advantage of water is its omnipresence. A serviceable splint can be made with its help. Such a splint should be protected from perspiration or other moisture, lest it be softened and its usefulness destroyed. It can be so protected by a covering of oiled paper or silk, mackintosh, or best, by a coat of varnish.

Silicate solution.—A stiffening solution with several qualities to recommend its use, is that of silicate of potash. (Silicate of soda is almost as serviceable.) Any

desired degree of rigidity can be imparted to a splint by using this solution, the amount of rigidity depending on the strength of the solution. A splint rendered rigid in this manner is not affected by perspiration nor, indeed, by momentary contact with fluids, as in washing. Another advantage, especially in cases of compound fracture, is that this solution renders the splint antiseptic.

In practice, the solution of silicate of potash generally sold for surgeons' use, and further diluted with water, can be employed. The commercial solution is regarded as a 100 per cent solution, and the percentage solutions spoken of in this paper are to be made by diluting the commercial solution with the proportion of water called for by the percentage; thus, a 70 per cent solution is made by mixing 70 parts of the commercial solution of silicate of potash with 30 parts of water. The commercial solution should have a sp. gr. of 1.3 to 1.4.

Dextrin solution.—Another useful stiffening solution is that of dextrin, in the proportion of about ℥viii to Oj of water. This solution adds some tenacity besides stiffness to the material treated with it. A splint made with its aid can be remoistened with water and remolded, quite an advantage in cases where from disappearance of swelling or other cause a closer approximation of splint and limb is desired. In practice, dextrin (to be had of paint wholesalers) can be carried about in powder form, and a solution in water extemporized when needed. (An addition of 8 gr. of corrosive sublimate to Oj of the dextrin solution will render it antiseptic.)

MOISTENING PROCESS.

A few words descriptive of the proper manner of moistening the material. The aim should be to get barely sufficient moisture into the material to render it semiplastic. If more moisture be absorbed, it becomes more difficult to maintain the molded splint in the desired shape while drying, and also unnecessarily lengthens the time required to dry the splint. I find the best way of moistening the splint blank is to apply the fluid used on each side of it, alternately, by means of a flat paste brush. A little practice will enable us to judge the precise amount of moistening best suited for our purpose.

DRYING.

The time required for drying the molded blank varies, for the different sheets employed, from ten to forty minutes; the thicker sheets, holding the more moisture, require the longer exposure to heat to drive it out. Any source of sufficient heat can be employed; a good kitchen fire is very efficient and generally convenient.

While the splint is drying it is serviceable to have yarn or string wound around the moistened form after its removal from the body, to aid it to maintain the desired form, until drying permanently fixes it.

Having treated of the materials used in splinting, I shall briefly consider their application to the human body, under the headings of (1) head splints; (2) trunk splints; (3) upper-limb splints; (4) lower-limb splints. This simplicity of classification necessarily will be violated in specific cases where compound splints, embracing parts of different systems, are constructed.

HEAD SPLINTS.

I shall describe two head splints—a nasal and an inferior maxillary splint.

1. A nasal splint.—The blank is cut from sheet No. 1 after a pattern, the general shape of which is shown in fig. 1, but which varies for the individual case. A 75 per cent solution of the silicate of potash is used to moisten the blank, for a rigid splint is required. The most of the difficulty in molding this splint is met with over the junction of the nasal and frontal bones. After the splint is molded

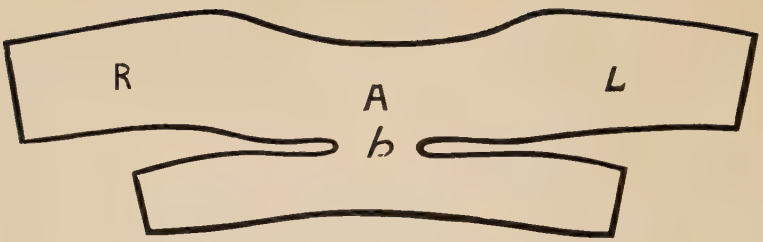

FIG. 3.—Pattern of lower-jaw splint. (Reduced one-third.)

FIG. 7.—Spinal jacket.

it should be looked after while drying, so that, if need be, rectification of its shape can be made before it has hardened too much in drying. This splint, completed, is pictured in fig. 2.

2. An inferior maxillary splint.—The general shape of the blank for this splint is shown in fig. 3, it being the pattern, reduced one-third, of a splint molded on a boy of 14 years.

The blank should be cut from sheet No. 1 and moistened with a 75 per cent solution of silicate of potash. To apply the blank: That portion of it corresponding to A on the pattern should lie under the chin, close to the jaw bones; the large arms on its sides should embrace the cheeks—R the right, and L the left cheek; the point corresponding to *b* should lie directly over the point of the chin. That part of the blank which will be found to lie in front of the point of the chin should now be bent upwards and molded over the anterior portion of the jawbones; the small flaps at each side will be found to lie over the cheek portions of the splint, to which they should be fastened.

The blank should now be carefully molded with the fingers over the bones, and, to complete the molding, a roller bandage should be snugly applied over it. After a moment's retention the splint should be removed and dried. The completed splint is pictured in fig. 4.

TRUNK SPLINTS.

The splints designed for the trunk of the body can be subdivided into three classes—(*a*) those that are intended to control the spinal column; (*b*) those that act on the shoulder system; (*c*) those that act on the pelvic system. The two latter are analogous, inasmuch as their action is not confined to the trunk but is carried over in a degree to the extremities.

(*a*) *Splints for the spinal column.*

(1) *A cervical splint.*—This splint is devised for fixation of the cervical vertebræ. The blank is cut from sheet No. 2 or from sheet No. 3, according as the case is that of a child or an adult. The general shape of the blank is shown in fig. 5, drawn from a pattern of a splint on a lad. The head of the patient should be supported in the desired position while the moistened blank is being molded over the back, shoulders, neck, and occiput; the molding is facilitated by the use of a gauze bandage applied snugly over the blank. After a short retention the molded blank should be removed and dried.

If preferred, the blank can be cut from sheet No. 1, and the neck piece in this case can be rendered strong enough by doubling over a flap cut for the purpose in the original blank, as pictured in fig. 6.

(2) *A spinal jacket.*—To treat this subject justly will require a special article. I shall here briefly suggest a technique for a simple, cheap, and serviceable jacket.

The blank is to be cut from sheet No. 1 and moistened with a 75 per cent solution of silicate of potash. This blank is of the simplest pattern, having length sufficient to envelop the patient's body once and a quarter around, and its width governed by the amount of spine we desire to control. The patient should be placed in the same position as for the application of a plaster jacket; he should have on him a tight-fitting woolen undershirt. The blank is to be applied to the body by commencing on the back about 2 inches beyond the vertebral spine and keeping that portion in place, guiding the rest of it around the body so as to overlap considerably on the back. A vertical line should be drawn on the overlapping piece from the armpit. The object of this line is to give position to the hinge joint which we require in the jacket to facilitate removal and reapplication. (The joint is made by bending the moistened blank backwards and forwards along this line until the

pulp is sufficiently broken—the fabric embedded in the sheet forming the hinge. After drying the jacket this hinge should be strengthened by gluing strips of chamois skin 1 inch wide over the hinge, inside and outside.)

The blank, having been applied to the body as above described, we proceed to make it conform to the body's surface as accurately as possible. We place over the spine a large pad (two large rolled bandages, each 4 inches in diameter and 6 inches long, placed end to end, do well), which serves to press the blank well into the hollow of the back. Further conformation to the body is obtained by the "pinching and folding over" method heretofore described. Here this method is particularly advantageous, for it adds threefold to the vertical strength of the jacket without a material increase of its weight. A gauze roller bandage should be so applied over the whole blank as to hold it in snug apposition to the body. After a few minutes' retention the bandage should be taken off and the jacket carefully removed; in doing so the hinge described above should be made use of, so as to disturb as little as possible the form imparted to the jacket. If the blank has been properly moistened, but slight aid to hold its form need be given to the jacket, till drying permanently fixes it. Thus, the foundation of a good spinal jacket, as pictured in fig. 7, is completed. It can be reenforced as desired. Straps can be fastened to it for its adjustment, or lacing bands can be applied to it for the same purpose; if preferred, it can be fastened on directly by cementing the overlapping flap to that portion of the jacket which it overlaps.

(*b*) *Splints for the shoulder system.*

(1) *Clavicular-scapular splint.*—This splint (fig. 8), made from sheet No. 2, is part of an apparatus devised for the treatment of dislocation (upwards) of the acromial end of the clavicle. The apparatus is described in the Boston Medical and Surgical Journal, Vol. CXXVIII, p. 186.

Other shoulder and pelvic splints I am constrained to here omit, for want of time for their proper elaboration.

UPPER-LIMB SPLINTS.

I shall describe but five of the simpler forms.

1. Arm splint—long (after Hamilton).—For this splint the position of the arm is to be that assumed as it hangs limp beside the erect body, the palm against the thigh. A pattern should be cut to approximate the limb for which the splint is intended. Its general shape is that shown (reduced one-fifth in fig. 9). A blank, with the pattern for a guide, should be cut from sheet No. 2, and moisted with a silicate or dextrin solution. The blank can then be applied to the arm, which is to be held at an angle from the body to permit of easier manipulation. The part of the blank corresponding to A, in fig. 9, should be placed against the inner side of the upper arm; the part equivalent to BB, against the ulnar side of the hand, over which it should be molded, as the curve thus formed gives additional support and strength to the lower portion of the splint. After careful molding of the blank over the arm and retention of it for a short while by a bandage it should be removed and dried. Fig. 10 pictures the finished splint.

2. External angular splint.—(Other angular splints, designed to meet the indications called for in the treatment of the various injuries of and near the elbow joint, are reserved for a special article.) This splint is easy of construction. The arm is to be flexed into the position we desire to retain it, and the forearm placed in the desired degree of rotation (in the splint pictured in fig. 12 the forearm is semiprone). A pattern should be cut to approximate the flexed limb. The general shape of the pattern is that of fig. 11. The line AA, in the original pattern, measures the distance from the point on the upper arm from which the splint commences to the

Fig. 8.—Clavicle-scapular splint. E. A. Tracy, 1892.

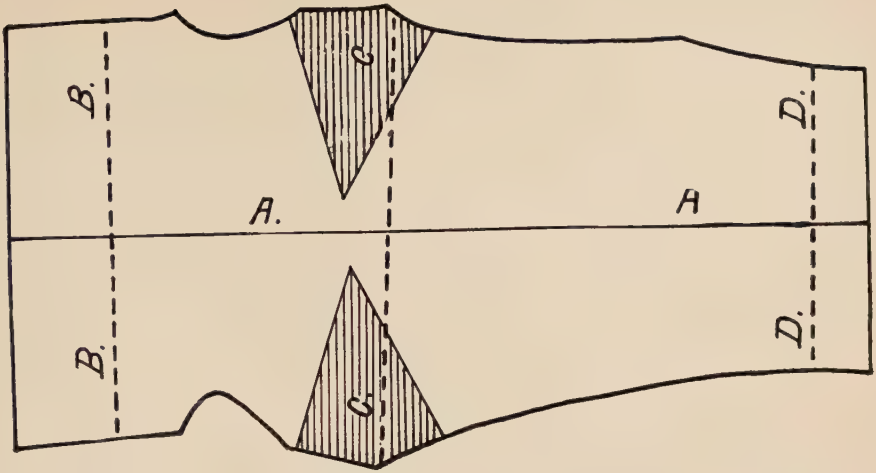

Fig. 11.—External angular arm splint. Pattern for left arm. (Reduced one-fourth.)

Fig. 12.—Right forearm semiprone. Outer aspect.

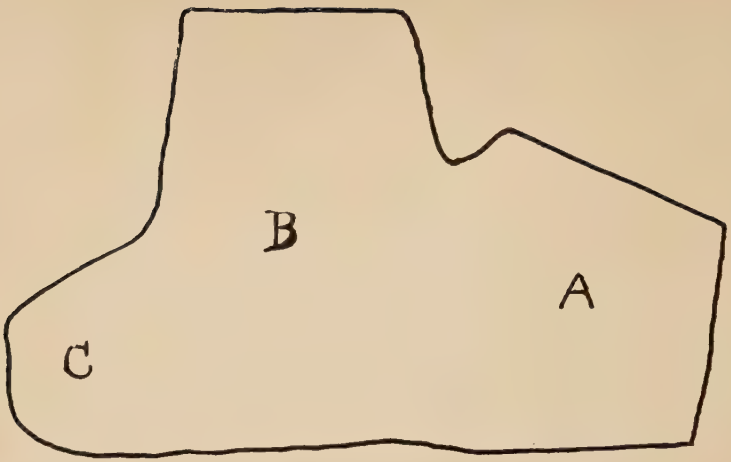

FIG. 15.—Thumb splint. Pattern of left thumb. (Reduced one-half.)

FIG. 16.—Thumb splint.

wrist, and this length should be taken over the olecranon with the arm flexed; the line BB measures a half inch less than the circumference of the upper arm; the line CC is somewhat less than the circumference of the forearm near the elbow, and the line DD equals its circumference at the wrist. The blank, following the prepared pattern should be cut from sheet No. 1 and moistened with a solution of silicate of potash.

The arm having been placed in the position for which the pattern was cut, the blank should be applied, commencing at the upper arm. The blank is to be applied and molded over the upper arm so that its opening coincides with a vertical line on the forearm bisecting the (crease) fold of the elbow. The upper arm and blank should now be grasped, while the lower portion of the blank, drawn taut over the olecranon, should be molded over the forearm; that part of the blank which will be found to bulge out at each side of the elbow, and which corresponds to the shaded part of the pattern in fig. 11, must be folded inwards towards the skin of the forearm. The molding of the blank is to be completed by the application and retention for a short while of a gauze bandage, after which the splint should be carefully removed and dried. The fixation of the joint can be rendered more certain by letting some glue flow between the folds about the angle.

The blank of the angular splint here pictured (fig. 12) had a half-inch margin at its upper end which was folded over, thus adding somewhat to the strength and comfort of the splint.

3. Palmar forearm splint.—A very simple but important splint. It is designed to meet the indications which Cheever emphasizes in the treatment of a Colles' fracture. This accurate surgeon says:

> The important point would seem to be, * * * not to press the back of the wrist down in such a way, by splints, that we shall lose sight of this arch, which is so marked, under the radius. * * * This arch must be well supported. * * * The splint should terminate at the head of the metacarpal bones, and the thumb and fingers should be left free. (Lectures on Surgery, by David W. Cheever, M. D. *See* Lecture X, Boston Medical and Surgical Journal, Col. CXXIX, p. 2.)

The general shape of the blank for this splint is shown in fig. 13. (The position of the forearm for the splint pictured in fig. 14 was that of semipronation, that of the hand semiflexion—its natural position of rest.) The pattern should slightly overlap the ulnar side of the forearm, so that there will be sufficient material in the blank to be molded over that side of the forearm. The blank should be cut from sheet No. 1 and moistened carefully with a 75 per cent solution of silicate of potash. The blank should be applied to the palmar surface of the forearm, so that the ulnar side is overlapped by the blank. The blank should then be carefully molded over the forearm in the position described above.

After snugly applying a roller bandage over the splint, commencing at the wrist, then enrolling the hand, and finally the arm, pressure should be applied by squeezing the forearm and splint between the thumb and fingers at a point 1¼ inches above the styloid process of the radius, where the arch of the radius is most pronounced. The direction of the pressure, it need hardly be mentioned, is from the palmar to the dorsal side of the forearm; its object, to give the splint an arch approximately nature's. After squeezing in the manner described for a moment, the splint should be removed and dried. The completed splint is pictured in fig. 14.

The curve of the splint caused by the arch of the radius is there clearly illustrated. The curve of the splint made by molding over the ulnar side of the forearm the overlapping portion of the blank on that side is important, because it is the main source of the strength of this splint.

4. Thumb splint.—This splint is intended for fixation of the thumb. The general shape of the pattern is shown in fig. 15. The blank should be cut from sheet No. 1 and moistened with a 66 per cent solution of silicate of potash. The blank is applied to the parts as follows: That portion of it corresponding with the part

marked A in the pattern should be applied to the dorsum of the hand; the part corresponding to B should be made to surround the thumb; the part equivalent to C to lay over the palm. The blank should now be molded with half of a bandage snugly applied over the thumb and hand; after a moment the splint should be removed and dried. This splint is pictured in position in fig. 16.

5. A finger splint.—The splint here described and figured is for the index finger. For other finger splints, a modification of the pattern, which will suggest itself to the surgeon, will be necessary.

The general shape of the blank is shown in fig. 17. The blank should be cut from sheet No. 1 and moistened with a silicate solution. The part of the blank corresponding to A of the pattern should be applied to the dorsum of the hand, and the part equivalent to BB should be applied over the dorsum and sides of the forefinger. The blank should be molded by aid of a bandage rolled around the hand and forefinger. After a moment's retention the splint should be removed and dried. The complete splint is shown in fig. 18.

LOWER-LIMB SPLINTS.

I shall describe but two:

(1) An anterior knee splint.—This is for fixation of the kneejoint. The general shape of the blank is shown in fig. 19. The part of the blank corresponding to A in the pattern, which would lay over the knee cap, should be cut out, as this permits of a better molding of the splint over the limb. The blank should be cut from sheet No. 2 and moistened with a silicate or dextrin solution. The blank should be applied so that the hole in it embraces the kneepan and its long axis coincides with the long axis of the limb. The molding of the blank can be perfected by aid of a snugly applied roller. After a moment's retention the splint should be removed and dried. The completed splint is pictured in fig. 20.

(2) A latero-posterior knee splint.—This splint is also for fixation of the knee joint. It is a modification of the so-called ham splint. It differs from the ham splint in having a surface which is applied to the side of the limb (preferably the inside) as well as to the posterior; this addition greatly strengthens the splint and aids its fixation. The general shape of the blank is shown in fig. 21. The blank should be cut from sheet No. 2 (sheet No. 3 for a very powerful limb) and moistened with a silicate solution. The blank should be applied to the limb so that the portion corresponding to the shaded part of the pattern lies over the internal aspect of the limb. The molding of the splint is perfected by applying a roller bandage snugly about it; after a moment's retention to the limb the splint should be removed and dried. A completed splint for the right knee is pictured in fig. 22.

(3) Lateral leg splints (internal and external).—These splints are so simple as to require no description. No pattern is necessary, the blank being cut from the sheet direct (No. 2)—the limb's outline having been previously drawn on it. Fig. 23 shows such an outline from the internal side of a boy's leg; fig. 24, an outline from the external side of the same leg.

AN APOLOGY.

I owe this Congress an explanation by way of an apology for the incompleteness of this paper. In June last I had the honor of reading a short paper on my material before the American Medical Association at Milwaukee. It then occurred to me to prepare a paper for the Pan-American Medical Congress, demonstrating the adaptability of the material for general surgical splinting. The shortness of the intervening time has prevented the performance of my purpose as completely as contemplated.

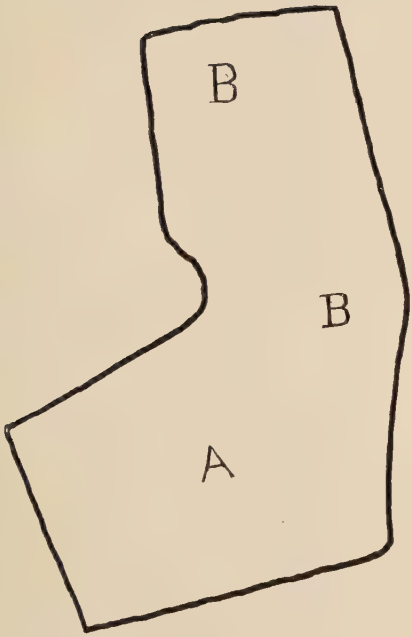

FIG. 17.—Forefinger splint, Pattern for left forefinger. (Reduced one-half.)

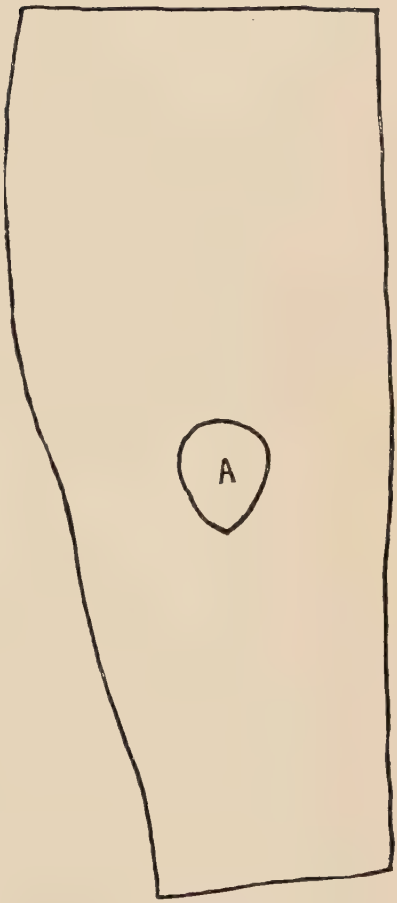

FIG. 19.—Anterior knee splint. Pattern for right knee. (Reduced one-fourth.)

FIG. 20.—Interior knee splint.

FIG. 21.—Latero-posterior knee splint. Pattern for right knee. (Reduced one-fourth.)

FIG. 23.—Internal lateral leg splint. Right leg.

FIG. 24.—External lateral leg splint

A CASE OF ACUTE ARTHRITIS OF THE HIP, WITH SOME REMARKS ON THE ETIOLOGY OF THE AFFECTION.

By AUGUSTUS THORNDIKE, M. D., of Boston.

The term acute arthritis of infants may be still considered to mean an acute destruction of the joint; it is a clinical definition of the condition of the joint, and is not intended to convey any information about the origin of the process. Acute joint destruction may be the result of (1) a syphilitic osteo-chondritis, or (2) a catarrhal synovitis becoming purulent and passing on to a destructive ostitis, or (3) a tuberculous ostitis running a very acute course, or (4) a septic osteomyelitis starting in or close to the upper epiphysis of the femur. (Lovett, Diseases of the Hip. Boston, 1891.

According to Mr. Thomas Smith (St. Bartholomew's Hospital Reports, 187, Vol. 4 x), who gave us the first clear description of the affection in English, the vast majority of cases are due to an acute infectious osteomyelitis of the upper end of the femur. Later investigators have gone further, and attributed all cases to an acute infectious osteomyelitis (Townsend, Arthritis of Infants, American Journal of Medical Science, January, 1890), but it does not seem possible, as yet, to differentiate between the cases due to syphilis, to rapid tuberculosis, to synovitis, and to osteomyelitis, and it therefore seems wiser to retain the name as a clinical definition, not a pathological one, although I firmly believe that the vast majority of cases are due to an infectious osteomyelitis. There are still too few published clinical reports, accounts of autopsies, and of bacteriological investigations to enable one to formulate the methods by which a differential diagnosis may be successfully reached, and the following case is reported solely for the purpose of inducing others to relate their own observations and to elicit a free discussion:

James C., aged 14 months, born and living in East Boston, was one of a family of four children, one of whom had died of "convulsions" at the tender age of 3 months. The parents, both of whom are alive and well, were descended from a healthy stock, and I failed to obtain any family history of phthisis, rheumatism, joint disease, or nervous disease. James was still nursing and had been well, with the exception of a light attack of measles when he was 9 months old, until four weeks ago. At that time he was treated for pain in the stomach and cold and improved for two weeks, when the pain became more severe, was worse at night, and was localized in the left iliac region and hip.

Three days ago another physician had been summoned, who "found a deep abscess," and advised taking the child at once to the Childrens' Hospital. This had been delayed because there had been no vomiting or diarrhea and the baby had nursed better, although the swelling and pain had steadily increased and spread to the entire thigh, and the baby had cried all the night through. Dr. Lovett very kindly asked me to see the case with him and later to operate on it at the West End Infants' Hospital, whither it was immediately transferred. This was on May 9, 1893.

It was a strikingly pale baby, with a pinched expression of countenance, and both the body and extremities were much emaciated and cool. The left thigh was flexed, and appeared to be uniformly swollen to twice its natural size from the knee to the iliac crest, and all the lower half of the abdomen was tender and prominent. Previous to the operation the pulse was 136. He was given 10 drops of brandy and 2 minims of tincture of digitalis, after which he took a warm corrosive bath, 1–3,000, was wrapped in hot sterilized towels and lightly etherized on the Lovett operating table, which consists of an aseptic metal top warmed by hot-water cans underneath.

The incision, 3½ inches long, was made as if for an excision of the hip and immediately voided about a quart of pus. The cavity was found to extend from just above the knee to the iliac crest behind, and the thigh muscles were all dissected out by it, while in front the finger easily passed alongside of the femur to the anterior ramus of the pubes and over it into the pelvis, where the size of the cavity could not be determined, although a considerable amount of pus (about f ℥ iv) was pressed out by the hand outside on the abdomen. The cavity was once irrigated with corrosive-sublimate solution, 1–5,000, then rinsed out with warm boiled water and two drainage tubes inserted, one following the course my finger had taken into the pelvis, the other lying along the outer side of the thigh.

The pulse had risen to 160, and two subcutaneous injections of brandy were given, while a large sterilized gauze dressing and a Cabot wire frame were applied. The operation was done as rapidly as possible to avoid shock. The drainage tubes were removed thirty-six hours later and a short gauze wick substituted. Brandy, 10 drops, and tr. digitalis ♏ j., were given on alternate hours, and the feeding was increased, as he soon became ravenously hungry. Mother and child went home six days after the operation. The temperature never exceeded 99.5. In six weeks the sinus was entirely healed, and the child was a fat healthy baby.

He came again to see me at my request on August 30, and had been perfectly well ever since. His mother had some difficulty in preventing his walking, which he did with a well-marked limp to the left side and with the left toes turning out. There was three-eighhts of an inch real shortening and half an inch less in the measurement of the circumference of the left thigh. The scar was firm, not sensitive, and had contracted considerably.

I have purposely omitted saying that the hip was dislocated. It was not only out of joint, but the femur at the time of operation was lying in a sea of pus and gave the impression of being almost free from attachments at the upper end. The neck was bare and was lying on the dorsum ilii, while a shallow cavity full of soft granulations occupied the site of the acetabulum, in the center of which I fancied I could feel a hole. I tried to replace the head in the acetabulum before applying the Cabot frame, and thought I had succeeded; but at the second dressing thirty-six hours after operation it was out of place.

On the third day Dr. Lovett and I made another futile attempt under ether to reduce the deformity. It was reduced and it would immediately get out again, so after two or three attempts the idea of reducing the dislocation was abandoned.

I do not know how frequently the attempt has been made to reduce dislocation occurring from acute arthritis of the hip; but I believe the common result in all cases which are well drained and which receive good supportive treatment afterwards is just this—that they generally get well and usually with a dislocated hip. Of the 19 new cases reported in some detail by Townsend in 1890, in the January number of the American Journal of Medical Sciences, 11 involved the hip; of these 5 were incised and all recovered and 1 recovered without operation; of the 4 fatal cases, in 3 no mention is made of operation, and in the fourth it is expressly stated that the abscess was not incised. In one other case (not operated) the child could not be traced, but was probably dead.

My own experience is small, but I have yet to see a case which has recovered without an incision. I have also scrutinized Dr. Townsend's report of these same cases in regard to the ultimate condition of the joint. In 3 cases nothing is said about it. In 1 case, the only unoperated case which got well, there was some motion in the hip and knee, and nothing in the report would imply the existence of a dislocation. Of the remaining, 5 were shown (by the position of the trochanter and the amount of shortening) to be dislocated, and 1 more was shown at autopsy to have a separation of the upper epiphysis from the shaft, while in still another the joint is stated to be in such a condition that at the post mortem examination it could be thrown out and replaced with perfect ease. In brief, in 7 out of 8 cases there was either a dislocation, or else after death the joint was found to be so far disintegrated that it was all ready to become displaced.

In the case of James C., just reported, Dr. C. A. Porter, who assisted at the operation, stained and examined 2 cover-glasses smeared with the pus and found among numerous other cocci a number of colonies of streptococci; 2 of these colonies I have roughly sketched, as seen under a $\frac{1}{12}$-inch oil immersion lens. Dr. A. K. Stone, who also kindly examined the same slides at the Harvard Medical School, was of the opinion that the appearance of the cocci growing in pairs was probably due to the rapid proliferation they were at the time undergoing. The sample of pus from which cultures should have been made was unfortunately too long delayed on its way to the medical school, so that Dr. Stone was unable to obtain any staphylococci pyogenes aureus from it.

To sum up in a few words what I have been able to find regarding the etiology of acute arthritis of infants: It attacks most commonly children in the first year of life, and traumatisms are not infrequently the alleged cause. Townsend has strongly

emphasized the fact that pyæmia, or the absorption of pus from some other part of the body, in many instances acts as the exciting cause, and cites instances where it followed an umbilical ulcer, an umbilical abscess, and empyema. The affection has also been noted in connection with varicella (T. Holmes: The Surgical Treatment of Diseases of Infancy), variola, measles, scarlatina, empyema, and pertussis. (Townsend *loc. cit.*)

According to Lovett, the rôle played by syphilis and tuberculosis in the causation of this affection are not as yet understood on account of insufficient pathological findings, and in older children the affection closely resembles and is likely to be confused with typical but rapid cases of bone tuberculosis. Furthermore, as Townsend justly remarks:

The causes of acute arthritis in infants are not always easy to ascertain. In a number of cases the most careful investigation fails to discover any.

The indications for the treatment of acute arthritis are self-evident. The general septic infection of the system must be met by increased alimentation and the free use of alcoholic stimulants. Brandy, beef-juice, and eggs should be added to the infant's natural diet. The hip must be kept quiet, and this is best accomplished by the posterior wire or Cabot's frame, which has been already so frequently described. Traction may relieve pain, but it is very unsatisfactory and hard to apply to such young babies. But the one cardinal endeavor of the surgeon should be to find the pus as early as possible and immediately drain by free, deep incisions frequently into the hip joint.

Babies appear to stand disinfection with corrosive-sublimate solution (1–5,000) remarkably well, and the shock from the immediate discharge of so large a quantity of pus will be minimized by the careful observance of the following details: (1) light etherization; (2) keeping the baby warm; (3) preventing loss of blood by the immediate application of pressure forceps; (4) by doing as rapid an aseptic operation as is consistent with securing good drainage and disinfecting the cavity. The surgeon must remember how young a baby he has to deal with and save as much blood and strength as possible.

After operation the hip should again be immobilized on the wire frame, which may be applied in a much straighter position than before, and may be worn underneath the dressings. The same supportive general treatment should be continued after the operation, and the stimulants should gradually be left off, if indicated. Quinine, digitalis, and sirups of the iodide of iron may be useful adjuvants to the treatment. If the general condition is poor just before operating, it is well to stimulate, and stimulants may be given per rectum or subcutaneously during operation, as in older children.

OBSCURE INJURIES OF THE SPINE FOLLOWED BY PARALYSIS OF LONG STANDING—RELIEVED BY SUSPENSION AND PLASTER-OF-PARIS JACKET.

By LEWIS A. SAYRE, M. D.,

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Having seen a number of cases of serious injury of the spine followed by paralysis, more or less complete, involving the bladder and rectum, which were relieved by suspension and a plaster-of-Paris jacket, and eventually entirely recovered; and two of these cases having recently called upon me in perfect health after the lapse of many years, it occurred to me that it would be desirable to look over my note-books, and publish the records of the cases for the benefit of the profession.

Case 1.—C. W. H.; about 36 years of age. On October 15, 1877, in switching

from a main track to a branch, the train going around a curve at a rapid rate, while he was standing in the rear of the car, he was violently thrown upon the corner of a stove and instantly paralyzed below the waist, probably by a fracture of one of the lumbar vertebræ, presumably the third. While paralysis of motion was complete at the time, there was some sensation and pain in the outside of the left thigh for a few hours. There was loss of control of the bladder and rectum, with a feeling of constriction, as of a tight band, about the lower part of the abdomen, the line of demarkation between the active and paralyzed parts being clearly defined. Pain at the point of injury was incessant, and severe beyond description. The bowels were evacuated by cathartics and clysters, and the bladder by the catheter. After ten weeks there was some return of sensation, with ability to evacuate the bladder voluntarily as a general thing, and in a little more than five months from the time of the injury there commenced a slight muscular action in the legs, which increased irregularly so that in a year after the hurt the limbs could be drawn up and pushed down in the bed, and even be made to move as in walking, with the body supported on crutches and by an attendant, but only a trifling amount of weight could be sustained by them.

During all this time there were frequent periods of almost total paralysis of both motion and sensation, greatly influenced evidently by the formation of numerous abscesses, which began about six months after the injury, discharging through the rectum, the outside of the right thigh, and the inside of the left—the latter giving exit to two fragments of bone, half an inch to an inch or more in length, and from one to two lines in thickness; one piece from two or three lines in width at the base, tapering to a point, and partly necrosed; the other, from one to two lines wide, somewhat pointed, and slightly curved or twisted in shape, but perfectly bright and clean, and showing its fracture very plainly. The patient, who was a physician, stated that he was confident that another fragment of bone had previously escaped per rectum, while still another was distinctly felt in the abscess that formed in the outside of the right thigh, but afterward disappeared. During the winter of 1878–'79 abscesses formed with great frequency, causing much loss of strength through the large quantities of pus formed and the severe pain they created. The partial recovery of the action of the muscles was in a great measure lost, so that they responded to the test of electricity no more than would those of a man recently deceased, and he was unable to distinguish the difference between heat and cold when applied to the surface of the extremities; indeed, so imperfect was sensation that both legs were badly burned on different occasions by too hot soapstones, it being necessary to use artificial heat to maintain the proper warmth in the extremities.

The abscesses finally stopped forming under the use of iodide of potassium, so that after May, 1879, only two appeared, the last about the 1st of August. With the cessation of the abscesses, improvement took place in the general health and in the action of the legs, apparently aided by the daily use of electricity and frictions, and the persistent exercise of the muscles by volition, so that by the autumn of 1879 he was able, at times, to get a part of his weight on his feet by supporting himself on crutches or over the back of the chair. But he was still unable to be off the bed except for a short time during the day, and often he did not even make the pretense of sitting up for more than a week at a time. He was compelled to evacuate the bowels by injections, except at times when suffering from painful diarrhea. He also suffered such intense pain in his spine and limbs all the time that he was forced to take from one to three grains of morphia daily to keep even bearably comfortable.

On November 30, 1879, the actual cautery having previously been applied with but trifling benefit, if any, with the assistance of my son, Dr. L. H. Sayre, I suspended the patient, and encased him in a plaster-of-Paris jacket. The relief from pain, and the improvement in the sensation and motion of the limbs thus produced, indicated the probable benefit which would follow from this mode of treatment.

The jacket was applied exactly as described in my work on Spinal Disease and Spinal Curvature, etc., the closest attention being given to the minutest details. The result was a remarkably accurately fitting case, which gave perfect and even support to the whole trunk, and complete and absolute rest to the injured and diseased parts. Three days later the patient could walk about the room without mechanical support, and two days after this he went on the street for his first walk in more than two years. Sensation, which had been very imperfect, became nearly normal; control of the muscles became constant and much more perfect; the frequent attacks of spasmodic contractions of groups of muscles entirely ceased, as did also the occurrences of almost total paralysis of the legs, during which he would often be unable to draw them up in bed for days at a time. Complete control of the bladder was obtained, and the bowels became much more natural in their action, enabling him to wholly discard injections. He was also enabled to discontinue the use of heat to the limbs, as they had become as warm as the other parts of his body. Though still

suffering severe pain at the point of injury, he succeeded within a period of six weeks in reducing the quantity of morphia to less than one-half of that taken before the jacket was applied. At this time the muscles were still too weak to sustain the weight of the body with the legs flexed, or to raise it on the ball of the foot and propel it forward as in natural locomotion. This gave him a necessarily slow and somewhat awkward movement, but there was apparently no paralysis of any muscle at that time, and he was able to walk a fourth of a mile without artificial aid of any kind, except the *moral* support of a light bamboo cane.

On removing the jacket, January 13, 1880, he found himself unable to walk across the room without support of some kind, while there was a marked increase of pain. There was also a preceptible change in the form of the trunk, it being two inches smaller around the waist, probably by absorption from lateral pressure of the jacket above the ilia, where it had been crowded in to get a point of support to maintain extension. Upon the application of a new plaster case there was immediate relief of the increased pain, and a return of the use of the legs as before, with considerable improvement in their action, the new jacket being, if possible, a better fit than the first. This showed most clearly the need of, and the great benefit derived from the extension and support of, the plaster jacket.

On February 1 he reported that he could then raise himself on his toes by voluntary contraction of the extensor muscles of the feet.

On March 11, 1880, he called at my office in perfect health. He would walk without cane or other support nearly as well as before the accident. He wore the jacket eighteen months, when he was perfectly consolidated. Since then he engaged in the active practice of his profession, until July, 1887, when he died.

Case 2.—W. F. C.; 29 years of age; was brought to me by the preceding patient, both of them having been injured by an accident on the same railroad. On August 10, 1877, while acting as mail agent, he was in a train which ran off the track and for some distance on the ties, during which time Mr. C. was thrown violently about the car in various directions. This caused partial loss of consciousness for a short time. He was soon, however, in the possession of his faculties and continued at his duties as mail agent until August 13. During these three days he suffered severe pain in the lumbar region, where there was noticed a slight swelling and contusion. Four days after the accident he gave up work and took to his bed, on account of severe pain in his loins. His bowels had been constipated for three days following the accident, and he had also experienced considerable pain in his head during this time. On the third day the patient, for the first time, was unable to voluntarily empty his bladder except while supporting himself by his hands on the arms of a chair, or by supporting himself on crutches. This continued up to the time he was first seen by me—January 17, 1880. He was confined to bed for twenty-two months, continuously so for thirteen months, with occasional intermissions of a few moments at a time. Three weeks after receiving the injury he noticed loss of sensibility in both feet, which gradually increased and extended upwards until it reached the knees, which was at the end of ten months. The anæsthasia now gradually subsided from the right leg, while it extended upwards in the left, involving the whole thigh.

During these ten months he was actively treated—local bleeding by means of leeches, blistering, iodide, and bromide of potassium, in full doses, being used. The loss of sensation in the left limb remained unchanged until July, 1879, when he felt sharp pain from the back pass down the inside of the thigh and leg, and while, before July, 1879, pricking with needles or the application of a strong current of electricity failed to cause any sensation whatever, he now began to feel a tingling from such operations. Voluntary motion in the left limb became impaired from the first, and at the end of seven months was completely abolished. Voluntary motion in the right leg was never impaired. There had been a total loss of sexual power from the first, though sensation of the genitals had been normal. The pain in the lumbar region was continuous and severe for thirteen months from the time of the injury, but it then began to diminish, and had gradually grown less severe. During these thirteen months the patient was actively treated as before described, and a brace was employed, but, owing to the continuous and severe pressure which it caused on the crests of the ilia and under the arms, it had to be discontinued. During this time he had been seen by a large number of distinguished physicians in different parts of the country, all of whom considered his case incurable, but thought he might receive some relief.

At the time when he first came under my observation, January 17, 1880, the patient weighed about 200 pounds, very nearly what he weighed before his injury. His appetite and digestion were good, and the bowels were regular. He slept tolerably well. The right limb was normal; the left incapable of any voluntary motion. There was some sensation in the limb, so that when a needle was plunged into the patient he experienced a sensation as though his leg had "gone to sleep." The limb was well nourished, having diminished but little in size. There was con-

stant pain in the back, though not very severe. Pressure over the first and second lumbar vertebræ caused an increase in the pain; crowding the vertebræ together by pressing on the head or shoulders increased the pain in the lumbar region, while when the superimposed weight was taken off by suspending the body by the shoulders, the patient felt perfectly easy. He was unable to sit erect longer than fifteen or twenty minutes without its causing violent pain and great exhaustion. When he supported himself on his crutches he felt very comfortable, and could remain so for one hour or more. The urine could not be voided except when the patient suspended his body from his shoulders by means of his arms or hung upon his crutches.

He was to-day cupped over the lumbar region, and about four ounces of blood obtained, deep punctures by means of a sharp tenotome being employed instead of scarification.

January 23: Sensibility of the left limb has increased since the cupping, and the pain on pressure in the lumbar region has diminished. The actual cautery was applied on each side of the lumbar spine over the transverse processes for about 3 inches.

February 3: Suspended the patient and applied a plaster of Paris jacket. When it had set he could stand without other support, which he had not been able to do since the accident. Sensation has returned to the left leg since the application of the cautery, and he can now slightly move the toes voluntarily.

March 16: A letter was received, in which the patient said: "Sensibility and motion are returning rapidly; the former is now nearly perfect. All the muscles now respond to the battery."

May 26: Patient returned. Sensation and motion greatly improved. He can now walk with the assistance of a cane. The jacket was removed and made into a corset. There was no tenderness on concussion or pressure along the spine. He could stand erect without any support.

September 20: He has been in perfect condition since last note; he can now stand without pain or support.

March 23, 1881: Mr. C. returned to-day in apparently perfect health, but he states that he can not yet do without the corset for any length of time. In December, 1880, he first attempted to do without it, and he became much exhausted after a few moments. He has, however, gradually increased in strength, so that he can now leave it off for a whole day, provided he does not walk or exert himself. The genital organs still remain powerless—no sexual desire or erection. He can pass his water easily when the jacket is off.

November 9, 1881: He returned in perfect health except as regards his sexual organs. He has not worn the jacket since last July.

June 26, 1886: Patient looks perfectly well; weighs 205 pounds; says he can not lift any weight without feeling it in the back. The numbness in the feet has entirely disappeared; sexual power has returned, but there is no desire.

August 2, 1893: The patient called to see me as he was passing through town with his wife and 3-years old boy. He was in perfect health, sexually as well as otherwise. He frequently rides 60 miles a day on horseback without suffering any pain or fatigue.

Case 3.—Mr. O. E. B.: 53 years of age; in June, 1879, was standing up in the rear car of a train when it jumped the track and ran on the ties for some distance, and then turned over. When he was removed from the wreck he had severe pain in the lower part of his back and no sensation in his lower extremities. The lower extremities were entirely motionless and cold. The right external malleolus was torn off, and he received various other bruises about the body. The bladder failed in its functions after the accident and the urine had to be withdrawn by catheter. The bowels became costive and required to be moved by cathartics. Digestion remained good and appetite fair. It was supposed by his medical attendants at that time that there had been a dislocation of the eighth or ninth dorsal vertebra, which was pressing on the cord.

He suffered great pain and loss of sleep. On the fourth day sensation began to reappear in the lower extremities, and this soon developed into a hyperæsthesia. This hyperæsthesia also affected the upper part of the body. He did not suffer from severe pain in the spine at this time. After the tenth day the bladder resumed its function. On the third or fourth day, after many trials, he succeeded in moving the second toe of his left foot slightly, and from this time motion gradually but very slowly developed in other parts of his lower extremities, and in the course of a few weeks he could extend the leg a little upon the thigh. A slight slough occurred on the left heel. The lower extremities remained very cold and had to be kept warm by hot bottles and the use of friction, etc.

In September he first rode out in a carriage, but while riding, could not be comfortable except when supporting himself on his arms, and each time when he came home he felt so very tired and exhausted he was finally obliged to give up this exercise.

On October 30 a felt corset was applied to him. This made him feel much better and gave support to his back. With this on he again rode out, and with more comfort. The right foot and leg remained somewhat painful. The right thigh was atrophied, measuring 1½ inches less than its fellow.

In the latter part of December he began to bear some weight upon his legs, and could, when first seen by me in March, 1880, bear his whole weight on his limbs after he had been helped to the upright position. While sitting up he had a frequent desire to raise himself upon his arms. He could flex the thighs moderately, and the legs upon the thighs. The left leg had more power than the right.

The tenth and eleventh dorsal vertebræ were more prominent than the others. The spinous and transverse processes were more prominent and much thickened, and on firm pressure considerable pain was produced. Below this point there was more than the ordinary lumbar lordosis. Sensation was still a trifle exaggerated below the tenth and eleventh dorsal vertebræ, except in the left foot, where there was partial anæsthesia. On touching the sole of the right foot, an immediate reflex muscular movement followed, while in the left, reflex movement was considerably delayed, and the foot then moved very slowly. When sitting up for any length of time, he supported himself by leaning on his arms, which he said "rested him." He had to be assisted to his feet, after which he could stand by supporting himself somewhat on his crutches. By being raised so as to take most of his weight from his feet, he felt better than when standing. After being supported in this way for some moments, he felt, when let down again, tender and uncomfortable along the lower part of his back.

About 5 or 6 ounces of blood were drawn from the lower dorsal region by means of deep incisions and cupping glasses.* The next day the patient voluntarily remarked that his thighs felt different, and that he could move these muscles voluntarily, which he had not been able to do since the accident. The actual cautery was applied on the right side, opposite the tenth dorsal vertebra, and on the left side opposite the fourth lumbar vertebra. When the burns of the cautery had healed, a plaster of Paris jacket was applied, from which he experienced some relief from the constant aching in his back, but not complete freedom from pain. He was able to move his extremities more freely, but the jacket did not give him the expected and desired relief to his pain and improvement in muscular strength, and it was evident that too much "dinner pad" had been used, and sufficient "waist" had not been made to the jacket. This jacket had been applied while he was sitting on a stool and partially suspended from his head and axillæ. A second jacket was applied while the patient was suspended from his head and arms while standing upright, the extension being carried to the point of making the patient comfortable. Great care was used in "waisting in" the jacket, and in this better-fitting jacket he had very little pain in his back, and was able to walk very much better. He said it gave him very great support.

Six months later, he wrote that he was improving surely, but as he thought, very slowly. The right leg continued to be 1½ inches smaller than the left, and had much less power, although it could bear the whole weight of his body. The left leg was strong but sluggish. The circulation continued to be slow in both lower extremities. He used his crutches in going out-doors, but in the house he could get ahead with two canes, and could take a few steps without support. He also thought he had improved more in the last four weeks than in the preceding few months.

In December, 1881, he called on his way to Europe; walked upstairs without assistance except his cane, and his hand on the baluster. He could walk on the level ground without jacket or support, and could concuss himself on his heels without pain, but preferred to wear the plaster jacket for protection. He could cross each leg over the other, but did this better with the left than with the right; he had voluntary control over the muscles of his lower extremities. The left leg is more tardy in its movements, although it is the largest. A plaster of Paris jacket was applied and made into a corset, and with this he sailed for Europe.

In 1887 he reported that he had steadily improved although his legs were still slow in responding to his will. He was still using massage and Swedish movements.

In February, 1892, he called, and stated that he had been able for some years to walk up and down stairs without assistance, and was in perfect health, and attending to active business, but was unable while lying down to rise from the floor without assistance. The patient was seen in June, 1893, and his back continued well.

Case 4.—L. V. T.: About 28 years of age; while in charge of an express car the train was derailed and fell down an embankment, the car turning over several times, and the iron safe striking the patient violently a number of times. He was rendered partly unconscious by the fall, and when he came to himself was unable to move his lower extremities. He has had very defective control of his

*In all of these cases, the blood was withdrawn from punctures made very deeply along the spine, and not from superficial scarification, a point which I think is of much importance in cases of congestion of the spinal cord.

bladder and bowels since the time of the injury. When first seen in 1886, some months after the injury, he was still paralyzed as to motion and sensation in the lower extremities, bladder, and rectum, but not completely so, as he was able to drag himself about on crutches, but was unable to rise without assistance. He had severe pain in the lumbar region, and the sensation as of a girdle around the waist. While partly suspended by the head and shoulders, he could move his legs with greater ease, and the girdle sensation disappeared; and with a plaster jacket could sit upright for several hours without discomfort. When unsupported by the jacket he had constant pain in his back, and was unable to sit erect for more than a few moments. Plaster jackets, applied while the patient was partly suspended by the head and shoulders, were renewed at intervals of about six months for a period of two years. The patient recovered control of his bladder and rectum in about eight months, and was able to walk with the aid of a cane in about a year, and at the end of two and a half years was perfectly well.

There are certain points of similarity in all these cases upon which I wish to dwell with especial emphasis. They all of them remained more or less completely paralyzed for long periods after the receipt of the injury—in one case over two years—and marked improvement did not begin until traction was made on the spinal column. In every case when the spine was stretched the patients said they felt better; they had more control of their limbs and sensation was keener. In one case the patient was unable to evacuate the bowels or bladder except when the superincumbent weight of the body was lifted off. All of these cases continued to feel this improvement so long as they were properly sustained by properly-fitting plaster jackets. When the support became broken down and failed to retain the spine in its stretched position the symptoms began to return, to disappear again on the reapplication of the stretching and retention of the spine in this position by an accurately adjusted support.

A NEW PAPER SPINAL CORSET.

By L. A. WEIGEL, M. D., of Rochester, N. Y.

From time to time various substitutes for the removable plaster of Paris jacket have been proposed. Leather, felt, silicate of soda, wire, wood, and other materials have been resorted to in the construction of jackets on account of their greater durability and comparative lightness. All have their advantages and disadvantages. To many patients the odor of leather is objectionable, and a leather jacket is not particularly light in weight. Felt and wood jackets are apt to get out of shape from becoming softened from the heat of the body in summer and they also absorb perspiration even when thoroughly shellacked.

The jacket I propose is free from all of these objections and possesses certain advantages not found in the others. The material of which it is made is a wood-pulp paper and linen and is of course made on a cast of the patient's trunk, which may be corrected and modeled as may be desired. The plaster cast should be a smooth one, either solid or hollow. The process of construction is substantially the same as the wood jacket described by Waltuch in the "Centralblatt für orthopœdische Chirurgie," January, 1889, the only difference being in the material used and the method of finishing. The jacket is made as follows:

A piece of linen thoroughly wet is smoothly stretched on the cast and secured by tacking it along a line in the center of the cast in front and also at the top and bottom. In subjects with well developed breasts and hips the application of linen will be much facilitated by approximately fitting it to the cast by sewing seams of proper shape along the axillary lines after the manner of fitting a dress waist to the form.

The linen thus applied should be free from wrinkles. When this is done the paper is put on in the following manner:

The paper is saturated with water and the excess removed by placing it between towels or absorbent cloths. It is then cut into strips of suitable width and length, the size depending upon the jacket to be made. The paste used for cementing the

various layers together is what is known as "Boston steam paste," such as is used by paper hangers, bookbinders, etc. It is applied thoroughly to each strip with a flat brush, but an excess should be avoided. In applying the paper the order given by Waltuch for his wood jacket may be followed. The first layer is put on in vertical strips, the second horizontally, as shown in the accompanying photograph.

It will be found convenient in putting on the vertical strips to begin in the center of the back and work in both directions towards the front, and if special strength is desirable in the waist line the vertical strips could be put on in two pieces, allowing them to overlap each other an inch or two in the center. The horizontal strips should extend across the back to the axillary lines where they are overlapped by strips coming from the center of the cast in front. After these two layers are applied a layer of linen cut into strips of convenient width is applied around the whole cast. It is always desirable to have the linen thoroughly dampened before application.

The next step is the application of two oblique layers of paper, as shown in the illustration, followed by another layer of linen. Two additional layers of paper are now applied as the first ones, that is horizontally and vertically. If desired a layer of linen may be applied as a finish, but this is not necessary.

Special points may be strengthened by a few strips of a paper applied like an elliptical wagon spring, or by simply crossing them at right angles to each other.

The jacket should be allowed to remain on the cast until thoroughly dry and artificial heat may be resorted to to hasten the drying process. Before removing it from the cast it is perforated to any desired extent with a drive punch. The jacket is removed from the cast by cutting along the upper and lower edges with a sharp knife and removing the tacks along the center in front, when it may be sprung off the cast.

It is then ready for enameling. There are various kinds of prepared enamels on the market which may be used. Aspinall's enamel is perhaps the best, and is applied with an ordinary flat brush. It is desirable to apply two or three coats of the enamel, allowing each coat to become thoroughly dry and hard before applying the next. When the enamel is thoroughly dry the edges of the jacket are bound with kid, and strips of leather, provided with lacing studs, are sewn on.

The special advantages of this jacket consist in its lightness and absolute cleanliness. The enamel prevents absorption of perspiration as it is waterproof, and if it becomes soiled it can be readily cleaned with soap and water.

A CONVENIENT APPARATUS FOR THE GYMNASTIC TREATMENT OF LATERAL CURVATURE.

By L. A. WEIGEL, M. D., of Rochester, N. Y.

The apparatus about to be described combines in one piece several others and is especially desirable where a physician is limited for room.

It consists of a rectangular frame constructed as shown in the illustration. It is 4 feet wide and 8 feet high. The uprights are about 4 inches square and are bolted to the crosspiece. The uprights are slotted throughout nearly their whole length and provided with holes 1 inch in diameter for receiving the pegs for a peg ladder. These pegs are simply inserted into the holes and are kept in proper position by a shoulder turned on them. The pegs are removable for two reasons: First, the distance between pegs may be increased or diminished, and, second, they also serve the purpose of securing any crossbars that may be put in the frame at any height. The crosspiece is provided with a hook for the ordinary head-suspension apparatus.

On the face of the crosspiece four pulleys are screwed on for carrying the rope to

which the swinging trapeze is attached. The base of this frame is provided with means for fixing the feet in the rotary exercises, which consist of a pair of roller skates, from which the rollers have been removed, fastened to a secondary board, which may be firmly fastened to the base with a thumbscrew running into a nut secured underneath.

It is unnecessary to go into detailed description of the various exercises that may be taken in this arrangement. The principal ones are shown in the accompanying illustrations and consist of self-suspension, climbing the peg ladder, rotation and oblique suspension by the hands.

When it is desirable to fix the pelvis for the purpose of twisting the trunk an arrangement similar to that shown in one of the illustrations may be adopted. It is the pelvic fixation mechanism I use in the apparatus for pressure correction.

THE ORTHOPEDIC AND GENERAL TREATMENT OF INFANTILE PARALYSIS.

By L. A. WEIGEL, M. D., of Rochester, N. Y.

It goes without saying that the prevention of a deformity is very much easier than its subsequent management when developed. The natural tendency of all paralytic cases is toward deformity of some kind, and it is rather surprising that the general practitioner pays so little attention to the management of this affection in its earlier stages calculated to give the child the best possible results. It is not uncommon to meet with cases in which drugs have been given for months at a time with the idea of influencing the paralytic condition, no attention having been paid to the insidious but sure development of all kinds of deformities we are so familiar with.

It would be a simple matter to support a paralytic foot, for instance, by some simple contrivance so as to prevent contraction of the tendo achillis or to prevent the foot from assuming either a varus or valgus position. The importance also of artificial support for paralysis of the quadriceps extensor muscles does not seem to be fully appreciated. Knee joints are allowed to become relaxed, misshapen, or hyper-extended for want of proper support. There can be no doubt that the progress toward improvement is materially aided by keeping a limb or extremity in its normal position. The weight of the body falling upon the joints out of their normal plane by reason of the absence of the natural muscular tonicity rapidly induces and aggravates any existing tendency to deformity.

It is not my purpose, however, to dwell upon these special points, but rather to call your attention to the management of deformities that are fully developed. Among these the most common are the various forms of talipes and malpositions due to paralysis of the adductor and abductor muscles of the leg. In untreated cases structural shortening nearly always occurs, which makes the deformity a permanent one, only to be relieved by operative or other methods of treatment. In some cases it is not always practicable to determine whether the deformity is due to actual structural shortening or to contraction of the unaffected muscles. In such cases the use of anæsthetics is of material assistance, as it enables us to eliminate the spontaneous or voluntary contraction and determine the exact amount of structural shortening that has taken place, and also enables us to determine the necessity for operative interference. By this means considerable time may be saved, and we may also be spared the annoyance of failure by purely mechanical treatment, for if an operation be necessary we can at once correct a deformity that might be subjected to mechanical treatment for an indefinite period without material benefit.

Permit me to relate briefly a case in point. Mary F., now aged 13, gives a history

of infantile paralysis dating back to her second year. Upon examination it is found that the left foot is drawn up, the whole leg rotated inward and firmly adducted to the extent of 7° The practical shortening is 1½ inches and the actual shortening less than one-half an inch; the inward rotation is about 60°. Under anæsthesia the malposition of the hip could be entirely overcome, whereas contraction of the heel remained permanent. The tendo Achillis was tenotomized and the foot brought into a normal position and maintained by plaster-of-Paris bandages. As there was no necessity for operative interference to overcome the adductions and no preparations had been made to prevent a recurrence of the deformity, after recovering from the anæsthetic it was necessary to resort to its use a second time. To prevent a recurrence of the adduction and inward rotation I constructed a simple wire ischiatic crutch which could be held in place by plaster-of-Paris bandages. It consists, as you will see, of a piece of wire bent so as to from a crutch, which rests up against the ischiatic fold of the opposite side. The upper curved portion is properly padded, while to the lower end is attached a strip of roughened tin or copper to be incorporated in the plaster bandages. This was applied and left on until a brace could be made to be worn for some further time.

This idea suggested itself by the method of overcoming crural adduction described by Dr. Henry Ling Taylor in 1889. It was found that the limb could be maintained perfectly in the corrected position obtained while the patient was completely anæsthetized. The application of this wire splint is shown in the photographs. The brace, which is to be worn for some time, was made with a foot plate shaped to the foot, to which was attached the upright, having a stop joint at the ankle to prevent the recurrence of the foot deformity. At the knee there is a free joint, and just above the knee joint a traction or pushing mechanism is hinged to swing laterally.

This mechanism consists of a piece of steel tubing carrying a crutch head properly padded. In this tubing a screw runs, which is worked by a milled nut, which allows any desired amount of traction to be made. This mechanism does not differ materially from that described by Dr. Taylor so far as the principle is concerned, and is simply applying the same principle in a different way for accomplishing the same purpose.

The result obtained by this method of treatment has been eminently satisfactory, and the extreme and distressing malposition maintained for eleven years was entirely corrected and the patient was walking about on the brace in less than four weeks.

The use of dry heat for the purpose of increasing the general nutrition of a paralyzed extremity is frequently advised, and undoubtedly does help to improve the condition. It is, perhaps, immaterial how the heat is applied, and the choice of methods is largely one of convenience and the facilities for doing it thoroughly. When left to the average parent of a paralytic child, it is my experience that whatever treatment is advised is very inefficiently carried out at home, so that I find it necessary to have strict personal supervision in the carrying out of any plan of treatment. For applying dry heat I have devised a heating box which works very satisfactorily. It is constructed upon the circulating hot water system, and is absolutely safe; there is no danger of accidental burns, and the degree of heat may be regulated to a nicety.

It consists of a rectangular box of galvanized iron, heavily lined with asbestus paper. In the bottom of the box are two coils of pipe, from which the heat radiates; at one end of the box there is a water tank holding about 2 quarts of water, from which the water enters a boiler below, this boiler consisting simply of a circular coil of pipe, underneath which is placed a small gas stove. The water in this boiler is rapidly heated, and enters the first coil at its highest point; then, after passing through the various coils, returns to the boiler to again start in its circulation. The other end of the box is provided with a circular opening, through which the leg is passed, the latter being supported by strips of webbing. The temperature may be raised to from 140° to 160°, and maintained at that point for any desired

length of time. The heat thus produced appears to be a pleasanter one than that furnished by other means, and the little patients do not object to being roasted for a sufficient length of time to thoroughly heat the extremity.

The use of salt baths, electricity, and massage are sufficiently well known not to require any reference.

THE PROBABLE CAUSE OF THE LIMP OF THE FIRST AND SECOND STAGES OF HIP-JOINT DISEASE.

By HARRY M. SHERMAN, A. M., M. D.

Orthopedic surgeon to the Children's Hospital, San Francisco, and to the San Francisco Polyclinic—the post-graduate medical department of the University of California.

I have never met with a satisfactory explanation of the cause of the limp of hip-joint disease; nor, even in those works that treat of the disease itself at greatest length, have I seen a full description of the limp and of the changes in its detail as the disease progresses. This is the more remarkable for all writers give the limp a prominent place in the list of symptoms, and most of them accord it the rank truly due it as the symptom of chief importance.

Gibney and Barwell are the only authors I know who have attempted to picture it. The former says (Diseases of the Hip, p. 234): "The lameness that shows itself as the earliest sign is the lameness peculiar to bone lesion." There is something about it that is often pathognomonic. In my notes I have come to speak of it as the "hip limp." Throughout all the stages when the patient does walk the element of stiffness is present. At times it is a mere awkwardness, and the child does not raise the foot so high as the other is raised; the step is shorter. "Later the gate develops into an unmistakable limp, the body, as the step is taken, being thrown cautiously to the side on which the disease exists."

Barwell is fullest on the subject when he is giving the differential diagnosis between the forms of the disease which he recognizes. (Diseases of Joints, p. 303.)

MODE OF LIMPING.

Synovitic.—Dragging of the limb, which is slowly and badly lifted; less marked in the morning, strongly marked in the evening or after exercise. Patient will bear his weight on limb pretty well with little complaint.

Femoral.—Foot not dragged, not advanced in front of the other; stands on it as short a time as possible, bringing sound one forward very quickly; body swung over to diseased side. If made to put much weight on limb complains much.

Pelvic.—Foot advanced a little before sound one, when weight comes on it body thrown to sound side; apparent great sense of insecurity, and patient often refuses to put weight on diseased limb; rather, it seems, from fear than pain.

Neither of these writers, however, in any way explains the cause and mechanism of the limp, yet I think an explanation may be given which will take account of and satisfy all the conditions, vital and mechanical, and help to make greater the already great value of the limp from a diagnostic point of view.

In making such an explanation it will be necessary to separate in the mind the limp as a symptom from the pain as a symptom. Those writers who have suggested the cause of the limp, Wright and Barwell, have given evidence of a connection, in their minds, between the pain and the limp, and the belief is quite general that a limp is due to pain or to an effort to avoid pain, and this idea was indeed held by me until I had observed the painless limp many times and been impressed by the fact. G. A. Wright says "the limp is due to tilting of the pelvis to take the strain

off the tender limb" (Hip Disease in Childhood, p. 43), implying that if the strain was put on the tender limb the tenderness would be increased, and would be painful. Barwell acknowledges that "every limp is not produced by pain," thus saying by inference that other limps are produced by pain.

That the limp is quite separate, in point of time, from the pain can be easily shown out of the writings of those who have described the disease. Wright (*lib. cit.* p. 43), Howard Marsh (Diseases of the Joints, p. 384), Barwell (*lib. cit.*, pp. 292–293), Bradford & Lovett (Orthropedic Surgery, p. 262), and Steele (Encyclo. Dis. Children, Vol. III, p. 1116) all mention the variability and even total absence of pain in a certain number of cases, but emphasize the constant presence of the limp in all cases, and the fact of its being the initial symptom.

In offering the explanation that I believe to be the true one it will be necessary to refer to the pathological condition present in hip-joint disease and its location; to consider the mechanical disposition of the parts; to review the normal movements of locomotion, and to describe the limp and its probable causation.

The pathological condition is the common one of tubercular infection of bone. Under the stimulus of the product of the bacillus of tuberculosis the infected region becomes infiltrated with round embryonal cells—"infected granulation tissue"—and these crowding into the intertrabecular spaces strangulate the blood vessels, and cut off the circulation. This "infected granulation tissue," too, "by its pressure and after-caseation, with its associated fluid, produces wasting of the osseous trabeculæ." (An American Text Book of Surgery, p. 264.) This result, the wasting of the trabeculæ, is of the same importance in infection of bone as is the destruction of lung parenchyma in infection of those organs, it is the destruction of functionating tissue; and just in proportion as the trabeculæ are wasted or destroyed is the function of the bone impaired, that is, its resistance to strain is lessened.

It is very likely that this is not at all a late result of the process, for "infected granulation tissue" is the earliest product of the tubercular infection, so that we would find, very nearly contemporaneously with the initial lesion, structural weakness of the bone.

This tubercular infection is most frequently in the head or neck of the femur. My own cases of excision of the hip lead me to think the initial lesion is very close to the epiphyseal cartilage, and a little more frequently on the diaphyseal side of it. In something over fifty such operations I have not seen one case where the conditions found would suggest that the disease had begun in the acetabulum. The general consensus of opinion, however, as given by Bradford & Lovett, is as follows (*lib. cit.*, p. 256):

Although in most cases the head of the femur is the primary seat of disease, there is no question that in others the floor of the acetabulum is first affected.

In the majority of cases, then, and I believe a very large majority, we have structural weakness of the femoral head and neck as the immediate and constant result of the disease.

This portion of the skeleton is constructed and arranged, relatively to other bones, in a particularly interesting manner. The arrangement of the trabeculæ in the interior of the neck, so that a very compactly latticed beam of bone springs from the end of the shaft, and extends by a gentle curve into the neck and head to bear the weight of the body, is too familiar to all to require more than mere mention here. But looked at from the outside, the mechanical arrangement of the head and neck of the femur constitute what is practically a cantilever, being fast at one end and extending out to bear weight at the other. ("Cantaliver, cantilever, I. *n.* 1: A block or large bracket of stone, metal, or wood, framed into the wall of a building and projecting from it to support a molding, a balcony, eaves," etc.—Century Dictionary.)

The pelvis with an eccentric supported point in the acetabulum and its horizontal position maintained by the thigh abductor muscles—attached above to the ilium, and below to the trochanter—constitutes practically an extension of the cantilever. Con-

sequently the necks and the heads of the two femora and the united ossa innominata correspond to the definition of a cantilever bridge. ("Cantaliver, cantilever, I. *n*, 2: One of the two long brackets or arms projecting towards each other from opposite banks or piers, serving to form a bridge when united directly or by a girder."—Century Dictionary.)

In regard to its work the cantilever is equivalent to that portion of a lever of the first order which is between the fulcrum and the weight, and the longer the arm is the greater is the disadvantage at which it works, and the greater is the strain upon its structure. Now with the pelvis horizontal transversely, and the body supported by one limb, the center of gravity, said to be located just anterior to the twelfth dorsal or first lumbar vertebra, would be furthest from the trochanter, and the body weight would be supported at greatest disadvantage and with greatest strain on the tissues, and obviously most upon those of the neck of the femur, through which all force is transmitted. To lessen this strain and to increase the mechanical advantage at which the parts work, the center of gravity must be brought more nearly, or exactly over the point of support, so that the support is by a prop, and not by any force of leverage. This change is not possible in respect to the head and neck of the femur, for these parts are rigid.

The most that can be done is to bring the center of gravity over the head of the femur, and so to shorten the cantilever arm by the distance through which the center of gravity is thus moved. In a position, then, with the pelvis tilted on the single supporting femur, and, in addition, such laternal motion between the lumbar vertebræ as is necessary to bring the anterior surface of the twelfth dorsal and first lumbar vertebræ directly over the head of the femur, the body weight is supported by the femoral neck at the least disadvantage.

There is in each step, at the time the body weight is supported by a single femur, a tendency to the assumption of this position.

Instantaneous photography, an instrument of precision in recording and measuring the positions assumed by bodies in motion, has shown that in each step, apparently only an act of progression, there are two other principal rythmical motions, and several more that are of less moment. These two are oscillations, one in a vertical and the other in a lateral direction, and they are quite as much a part of the step as is the progression. Of these two the vertical oscillation represents the rise and fall of the body, which traverses, during the progression, a curved line, of which the supporting leg is the radius, the trajectory thus described not being a mathematical curve, but, instead, irregular, the length of the supporting limb varying by joint motion.

The lateral oscillation represents the sway of the body as its supporting point is changed from one acetabulum to the other and is not ordinarily visible as we see a person walking. It is an equilibration both to counteract the tendency of the body to fall towards the unsupported side, and also to balance the weight of the lifted limb and the pull developed by its swing forward, and at the same time it is the beginning of a lateral sway, which, if continued, would move the center of gravity sideways until it was directly over the head of the femur.

In the first stage of the disease, shortly after the time at which the pathological process begins, and while the lameness is not constant, but noticed only in the morning, or after rather violent exercise, or after the whole day's play, the limp is a slight increase in the lateral sway of the body towards the affected side and nothing more. It is very slight and must be looked for to be found, and then can not be seen if the gait is at all faster than a walk. During this first stage, while joint motion is checked at the extremes it is still ample for the purposes of locomotion, and none of the stiffness which is so marked later is apparent.

In the second stage, the area of infected bone increasing, and muscular rigidity lessening joint motion, the lateral sway, in the first place, is greater and, in the second place, the progression on the affected limb is shortened. The lateral sway,

considered alone, soon reaches a maximum and is constant there, but it is combined with the other unusual movements which result from the crippling of joint motion. The crippling of extension introduces the "element of stiffness" and it is compensated by a slight act of extension between the lumbar vertebræ. A little later flexion has been curtailed, the proper advance of the foot is impossible, and what advance is accomplished is assisted by the swinging forward of the side of the pelvis by a rotation inwards at the opposite hip. Still later, rigid flexion permits too little extension to let the heel reach the floor, and the patient walks on the toes with a decided up-and-down motion from step to step; rotation inwards at the sound hip to advance the foot of the affected side is more extensive, and, in addition to violent lordosis of the lumbar spine, there is a little swing of the whole body on the tip-toed foot to accomplish some progression.

All of this somewhat complicated action is reducible to two elements. One is the lateral sway, the other is the lessened joint motion. The latter is easily traceable to muscular rigidity maintained to prevent an amount of motion that would be a trauma. The lateral sway, however, is present before either pain or checked motion, so far as this is appreciable in the step. It is, at the beginning, the merest increase in the range of the normal lateral oscillation of locomotion, but it gradually increases until it is in each and every step, a very close approximation to the position in which the center of gravity of the body is over the head of the femur and the strain on the neck of the femur is reduced to a minimum. It is an act which lessens the strain put on a part structurally weak, and an act which is, in all probability, instinctively taken for the express purpose of lessening that strain. It is sharply in contrast to every other act in the detail of the hip limp in that it is neither a limitation of a normal motion in the diseased joint nor any increased compensatory motion in other articulations, but it is an independent motion, at first present alone, and then coexisting with the others; but whether it be alone or not it serves the purposes indicated, and has all the semblance of a means adapted to an end.

Barwell states that in cases of original pelvic infection the body is thrown to the sound rather than to the diseased side when weight comes on the diseased joint. I have never seen such a limp, but, other conditions being the same, the explanation here offered for the femoral is equally applicable to the pelvic cases. If the floor of the acetabulum is affected in any but its lower portion, no motion but that towards the sound side will lessen the strain; other motions will change the direction of the strain, but they will not, in any material degree, lessen it. The motion to the sound side is a fall of the body towards the unsupported side while the sound limb is lifted, advanced, and replaced on the ground, and is prompted by a refusal to put the full strain on the structurally weak bone, even if the act might not cause definite pain. The dilemma of the pelvic cases is noted by Barwell, who says the refusal is prompted by fear rather than pain, and it is evident that in the refusal they take the only course left to them to lessen the strain.

There is one other consideration this explanation suggests which is of some interest—there must be some means by which an appreciation of the work done by a bone is communicated to the central nervous system, a "bone sense" akin to the so-called "muscle sense." It is no more improbable than the "muscle sense," nor the fact that in the case of the skin—a passively working tissue like bone, as distinguished from an actively working tissue like muscle—we have an appreciation of pressure or of stretching; for bone is, like all the other organs, a living tissue, and is properly supplied, we know, with the grosser sets of nerves as is the rest of the economy. Furthermore, in the disease locomotor ataxia we see the general sensibility, and with it the "muscle sense" abolished, and at the same time can observe that in some cases the patients use, without pain or limp, joints that are completely disorganized, and with quite extensive necrosis of the bone. Of course this could not be witnessed in cases where the larger and more important articulations were so affected that the mechanical conditions were disturbed enough to interfere with function;

then, of necessity, there would be a limp, but I have seen in a tabetic patient complete disorganization of the metatarso phalangeal articulation of the great toe, and it did neither pain him nor in any particular affect his gait; that is, he put on the diseased and weakened bones the strain that he did on his sound bones.

There is another pathological condition which produces in the neck of the femur the same effect as does tuberculosis, namely, structural weakness, and as a result of this a perfect imitation of the "hip limp" as seen in the first stage of the disease, and that is, osteo-sarcoma of the femoral neck. A girl was admitted to the Children's Hospital in San Francisco, with a swelling in front of the great trochanter. She walked with a "hip limp." The diagnosis of malignant disease was made, the thigh was amputated through the hip joint, and the specimen showed that the tumor had its origin in the center of the neck of the femur, and that, growing from this point and perforating the shell of the bone, it had destroyed about one-half of the tissue of the neck. In the facts of the presence of structural weakness and the character of the limp the case was like one of hip-joint disease.

If the paralysis of acute anterior poliomyelitis affect the thigh abductor muscles, the preservation of the equilibrium of the body is impossible without lateral sway of the trunk, so as to bring the center of gravity over the head of the femur. This limp is very like, but not exactly similar to the hip limp. The resemblance between them, which has been mentioned by Bradford and Lovett (lib. cit., p. 280), is enough to deceive a careless observer.

After resection of the hip and recovery of the patient so that walking without a stick or crutch is possible, there is a limp very similar to the limp of hip-joint disease. After a hip resection the mechanics of the joint are, of course, completely abolished, and in locomotion the trunk must be accuartely balanced on the end of the shaft of the femur. This is done by a lateral sway of the trunk, and the equilibrium is, in part, maintained by all the muscles that reach from the femur to the os innominatum, contracting and acting as stays for the unstable pelvis. This motion has been illustrated in an article by me entitled, "Instantaneous photographs illustrating the gait of a child from whom both hips had been removed," and published in the third volume of the transactions of the American Orthopedic Association.

OBSERVATIONS ON THE ROTARY-LATERAL CURVATURE OF THE SPINE, WITH SPECIAL REFERENCE TO ETIOLOGY AND TREATMENT.

By JACOB TESCHNER, M. D., New York.

The subject, rotary-lateral curvature of the spine, is one upon which there has been much written, concerning the etiology, pathology, and treatment, and upon which there has been considerable discussion. This would in a measure indicate the usually unsatisfactory or only partially satisfactory results that are derived from the treatment of these cases, and the importance of giving them proper and early attention.

I shall not in this paper attempt to enumerate all the ideas and views of the etiology and treatment of this condition as presented by the leading orthopedists of this country and Europe, but I shall as briefly as possible classify the causes which are generally accepted, and give the results of my observations, laying the greatest stress upon the most important and the most frequent causes, and submit the treatment which I have found successful.

Rotary-lateral curvature occurs most frequently, according to several observers, between the seventh and fourteenth years, only a small percentage occurring after

the eighteenth year. The following figures will show the percentages occurring during the different periods in 1,000 cases of Eulenberg, viz:

No.	Years.	Per cent.	No.	Years.	Per cent.
0	2	0.5	6	7	21.6
2	3	2.1	7	10	56.4
3	4	0.9	10	14	10.0
4	5	1.0	14	20	2.8
5	6	3.3			

Girls are more prone to this disease than boys. Why this should be has not been definitely determined, but there is little doubt that the differences in the rapidity of growth and development during the earlier years, the organization of the nervous systems, the conditions favoring or opposing muscular development, and the habits of the sexes after school hours are important elements in determining this fact.

I will pass over the pathological and anatomical causes, viz: Pleurisy with adhesions, empyæma, paralyses from different causes, rachitis, Potts' disease of the spine, inequalities of the length of extremities, and loss of an extremity, and consider only the following causes, viz: (1) Hereditary tendency. (2) General temperament and the condition of the mind and nervous system. (3) Lack of development of the muscular system, and the general physical condition. (4) Habitual faulty position with superimposed weight.

(1) *Hereditary tendency.*—I have not been able to find any allusion citing this as a factor in the etiology of the disease, but I have frequently noticed slight curvatures, and upon closer examination found decided scolioses in the mothers of girls brought to me for treatment.

I have at the present time 4 patients under treatment whose mothers have distinct scolioses, and one of these patients has 4 sisters, ranging from 15 to 20 years of age, with slight curvatures.

I am of the opinion that if this condition of the mothers of patients were more closely investigated, that "hereditary tendency" would become generally accepted as one of the causes.

(2) *General temperament, and the condition of the mind and nervous systems.*—This heading is one which is apt to give rise to considerable doubt when cited as a cause, because most observers lay all their stress upon the deformity and its mechanical treatment, and to a certain extent lose sight of the general, mental, and nervous conditions of the patients.

The general temperament of most girls afflicted with rotary-lateral curvature is apathetic, indifferent, somewhat lazy, and sometimes a trifle morose. As a rule they are backward in their studies at school, and usually show a decided disinclination to romp and play, after school hours, with the same vigor and enjoyment as do their companions.

The facial expression is frequently a vacant stare, the lower jaw dropping and the mouth being open, giving the patient a silly appearace.

This was particularly well marked in a patient sent to me for treatment by Dr. Leonard Weber, of New York, and it became more conspicuous by its absence, as noted by Dr. Weber, after the patient had been under treatment for a short time. Of course, there are all gradations between an highly intelligent and an almost idiotic countenance, but where there is a lack of intelligent expression the face certainly changes after energetic treatment.

Under this heading, I would also call your attention to a peculiar lack of coordinating power, or lack of muscular control, with which some patients are possessed. It seems to some patients, until properly instructed, almost an impossibility to fully

extend an entire extremity, either upper or lower. If, for example, a patient be instructed to hold an upper extremity abducted at a right angle to the body, palms down, and hold it rigid at all the joints and fully extended, the observer will find that if the wrist be extended, the elbow is apt to be flexed, or if the elbow be extended, the wrist will be flexed, or if both the wrist and elbow be extended, the fingers will be either flexed or hyper extended.

This lack of coordination or lack of muscular control can be and is made to disappear through the muscular instruction and development which forms part of the treatment.

Patients usually, when told to grasp an object firmly, a cane, for instance, neither properly approximate the palm to it, so as to exert an even pressure upon it, nor do they encircle it with the thumb; they hold it between the thenar and hypothenar eminences of the palmar surface of the first set of phalanges, the thumb being at a right angle to the phalanges, and the palm being hollow, thereby showing their inability to exert muscular influence in a normal or proper direction.

(3) *Lack of development of the muscular system and the general physical condition.*—General muscular development is frequently found to be very poor or almost wanting. In most cases the trapezii, the rhomboidei, the sterno-mastoids, and deltoids especially are found almost rudimentary. The back, chest, and abdominal muscles are generally found in worse condition than the muscles of the extremities. With this state of affairs we naturally expect and find a lolling and lounging muscular habit, and a general want of muscular tonicity and precision. Patients, when suspended, are rarely able to sustain their own weight.

The physical condition is as a rule not good, the patients being frequently the victims of a poor digestion accompanied by malassimilation. In girls leucorrhœa is generally present and frequently copious. In mentioning the general condition of health I do not wish to be understood to claim that when the general system is run down a curvature will occur, or that there are no cases of curvature in which the general health is not impaired, but I do claim that when there are tendencies to a curvature, as cited above, with the conditions as explained in the next paragraph, an impaired condition of the general health will greatly assist the rapid development of the deformity.

(4) *Habitual faulty position with superimposed weight.*—Resting the weight of the body upon one foot while standing, or sitting more upon one buttock than upon the other, and in either position permitting the shoulders to fall forward and the chin to approximate the chest, shows a relaxation of all the muscles which hold the spine erect in the normal condition, and permits a sagging of the upper portion of the body upon the lower, and twists the spine and trunk into a mild form of deformity, the mechanism of which was so ably demonstrated by Dr. A. B. Judson* at the meeting of the American Orthopœdic Association, in September, 1890. This deformity passes off when a normal standing or sitting position is assumed, but when such temporary deformity occurs not only daily, but several times a day, and for protracted periods, it gradually increases and later becomes permanent and fixed, and produces the actual bony and ligamentous changes which are met with in cases of long standing.

The faulty sitting position is more frequent than the standing, as children, as a rule, spend about five hours in the twenty-four sitting in schools. I will, therefore, call your attention to the school habits of children, while sitting, and their shifting of positions to relieve the tiring of the strained groups of muscles.

Dr. A. Baginsky † in his admirable paper read before the "German Society for the Care of Public Health" at Berlin in March, 1888, says, "More and more are

* The rotary element in lateral curvature of the spine. A. B. Judson, M. D., N. Y. Trans-American Orthopœdic Ass'n, Vol. III, 1890.

† "Ueber Ruckgrads-Verkrummungen der Schulkinder." Deutsche Med. Zeitung, Berlin, 1888, IX, pp. 529–541.

surgeons convinced through their anatomical and physiological investigations and from their practical observations, that scoliosis, the most important of all deformities of the spine, in a very large majority of cases owe their origin to the influence, of school life upon the organism of the child."

This writer further shows that if we observe a class of children during the early portion of school hours, more particularly if the subject of the lesson be interesting and the weather cool, they will all sit quite erect, with their heads well poised, their chests brought forward, their feet evenly placed upon the floor (if the lower extremities are not too short to reach it), and the frontal plane of the body parallel to the edges of the desks in front of them. Later on, one by one, the children will permit the shoulders to drop and fall forward, the chins to approximate their chests, thereby changing the entire contours of their spines.

There is a tendency to turn the trunk to the right or left, in order to relieve one buttock of the weight of the superimposed body. Some are apt to cross the thighs, thereby producing the same effect. The frontal planes of the bodies of the children are then no longer found to be parallel to the edges of their desks.

Dr. Baginsky shows even worse positions which are assumed by children during their writing lessons, when the frontal planes of their bodies are placed at right angles to their desks.

Any change of position, no matter how slight, changes the center of gravity, and those muscles which hold the body upright are strained as soon as the position recedes from the erect one. When one set of muscles is thoroughly tired, the child changes position to relieve the strained set of muscles, and brings those muscles which have not been taxed into play.

When children become habituated to faulty positions in sitting, they are apt to and do assume analogous faulty positions while standing, and when these faulty positions have been maintained for a while, decided scoliotic attitudes are seen, and, as I stated before, even though they be temporary, they become habitual, and lay the foundation for well-marked deformities.

Before taking up the treatment of scoliosis, I do not think it amiss to call general attention to the pernicious effect of long and continued school hours, without intermission for play or calisthenics, and also the improper furnishing of schoolhouses with benches, chairs, and desks of a regulation size, without regard to the varying sizes of the pupils, and consequently without any regard for their comfort and well being. Sitting at best is tiresome, not only to children, but to everyone.

TREATMENT.

In every case of rotary-lateral curvature, from the mildest case to the one which appears beyond redemption, the first efforts should be directed to the prompt removal of the causes, apparent or real, of the deformity. Any shortcoming of the extremities from paralysis, inequalities, or deformities, as well as disturbances of vision, should be corrected. The child should at once be prohibited from attending school, thereby eliminating the most persistent and potent cause. The general condition of health should be carefully attended to by the correction of any disturbances of digestion or assimilation, by frequent baths to improve the condition of the skin, by the administration of tonics, if found necessary, to improve the nervous and muscular systems, and by sufficient open-air exercise.

The patient should have a properly constructed chair to sit upon; the seat of the chair should incline downward from before backward, the inclination forming an angle of about 8 degrees with a line parallel to the floor upon which the chair rests. The back of the chair should be properly shaped to receive the back of the patient, and it should extend at a right angle to the seat, up to the shoulders of the patient; the seat of the chair should be at such a height that the patient can rest the feet comfortably upon the floor. In a chair of this description the patient assumes a slightly reclining position, thereby relieving all muscular strain.

The patient should be instructed to rest frequently for from five to fifteen minutes at a time by lying supine upon the floor, the lower extremities fully extended, and the upper extremities also fully extended above the head. Self-suspension by means of a Sayre apparatus twice a day should be advised, and the patient should be instructed in exercises while suspended from an horizontal bar or from rings.

I shall now consider the various degrees of scoliosis, with reference to the treatment of each degree.

(1) Habitual scoliosis which can be obliterated by the voluntary muscular efforts of the patients.

(2) Scolioses which are not affected by muscular efforts, but which can be reduced or obliterated by suspension of the patients.

(3) Scolioses which are not affected by muscular efforts or by suspension, the deformities being fixed.

In all three forms of scolioses nothing is of greater importance than proper, thorough, and regular gymnastic exercises, which will equally develop the entire muscular system. Various kinds of exercises have been advocated by different writers, and excellent results have been claimed by them.

I wish especially to call your attention to that excellent paper of Dr. Reginald Sayre,* in which he minutely describes the gymnastic exercises which patients should be taught. These exercises with slight variations, according to the requirements of individual cases, are the ones I use in cases which come to me for treatment.

(*1*) *Habitual scolioses which can be obliterated by the voluntary muscular efforts of the patient.*—In these cases I place my entire dependence for good results upon the general directions before described, and systematic and regular gymnastic exercises. I neither consider it necessary nor wise to give support to the patient by means of any apparatus or even a corset, but I prefer to leave the muscles which are being developed and strengthened by exercises, entirely unrestrained and free.

(*2*) *Scolioses which are not affected by voluntary muscular efforts, but which can be reduced or obliterated by suspension of the patients.*—In this class of cases I adopt the same course and plan of treatment as in the first class of cases, but in addition I find it necessary and beneficial to apply well-fitting, light, and well-cemented plaster-of-Paris corsets, while the patients are suspended in a Sayre apparatus, and to permit the patients to wear them, if the deformities are obliterated when the first corsets are applied, until they have improved sufficiently to enable them to correct their deformities through their own muscular efforts. They are then treated as patients of the first class. In those cases in which the deformities are only reduced but not obliterated by suspension, as the patients improve under treatment, new corsets are applied from time to time, until at last the deformities can be entirely obliterated by suspension. These also become patients of the first class.

(*3*) *Scolioses which are not affected by voluntary muscular efforts or by suspension, the deformities being fixed.*—The treatment of this class is the same as that in the foregoing class, but other means must be resorted to, to reduce the fixed deformities of the ribs and spine. I have found the forcible daily twisting of the spine in compression of the ribs of considerable value in reducing the fixed deformities, and I have within the past two weeks begun the use of an apparatus used by Dr. Albert Hoffa, of Wurtzburg. This apparatus is described in the Zeitschrift für orthopädische Chirurgie, 1891. Although I am not in position to claim any results or benefit from the use of the apparatus, I judge from appearances, and from the combined effect of suspension, fixation of the pelvis, twisting of the spine, and pressure upon the scoliotic eminence, that it will prove to be a powerful adjunct to the more successful treatment of old cases of fixed scolioses.

It will give me great pleasure to report the results of cases treated in this manner, whether successful or otherwise.

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* New York Medical Journal, 1888, Vol. XLVIII, pp. 533-538.

DISCUSSION.

Dr. SCHAPPS, of Brooklyn. The result of my experience in the treatment of scoliosis has been to discard braces or supports in all cases, except possibly those who had been already using supports and could not be weaned from them.

THE TREATMENT OF POTT'S DISEASE OF THE SPINE.

By A. B. JUDSON, M. D.,
Orthopedic surgeon to the Out-patient Department of the New York Hospital.

While caries of any part of the vertebral column can not be considered an unimportant affection, it is well to recognize the fact that much depends on the region of the spine involved. In the middle dorsal region it is perhaps the most serious trouble, excepting malignant disease, that can attack the bones of the growing child. In this part of the spinal column the destruction is often extreme and the deformity great, evidently because the affected bones are at the greatest disadvantage mechanically. Lower down the vertebral bodies are so large that they do not lose their relation of mutual support until the loss of substance is very extensive, and above, the vertebral bodies, though small, have less weight to sustain. But in the intermediate portion, not only do the bones feel the incessant movements of respiration, but they are also more widely moved in flexion and extension and in lateral curving with rotation than in other parts of the column, and furthermore they are exposed in a peculiar manner to the risk of overstrain from their position in the middle of the column. I think it is in the experience of all of us that in this middle and upper dorsal region Pott's disease continues longest before consolidation takes place.

Here we have a most striking illustration of the fact that the recovery from articular osteitis is postponed by unfavorable mechanical environment. As joints in the upper extremity, free from the mechanical stress attending locomotion, recover easily, while those which, in the lower extremity, bear the heat and burden of the day, recover only after prolonged and extensive destruction, so articular osteitis in the cervical region of the spine is easily curable while in the upper and middle dorsal region relief and repair come only after desperate and prolonged risk.

How can we best assist nature to cure this disease in this difficult part of the skeleton? The same general rules apply here as in the treatment of articular osteitis in the lower extremities. We can not cut short the disease by an operation or by any procedure whatever, but can expect with confidence, and must promote by our best endeavors, the arrest of destruction and the beginning of repair. What, then, can we do to put the affected vertebræ in their best attitude and to raise the defensive and reparative powers of the system to their highest efficiency? As in articular osteitis occurring elsewhere we desire (1) to relieve the bone of the duty of supporting weight and concussion, and (2) to prevent the affected joint from motion, believing that the arrest of these two functions, weight bearing and motion, are essential to good treatment.

It does not seem wise to keep the patient recumbent for the long period necessary. In the management of hip diseases we put the affected limb to bed, so to speak, while the patient is up and about. But a similar resort in Pott's disease is impossible. Since the patient must be up and to a certain extent active in locomotion, our best resort, in my opinion, is to take what benefit can be had from the application of a lever making pressure from behind forward in the neighborhood of the posterior projection, and counter pressure from before backwards at two points, one above

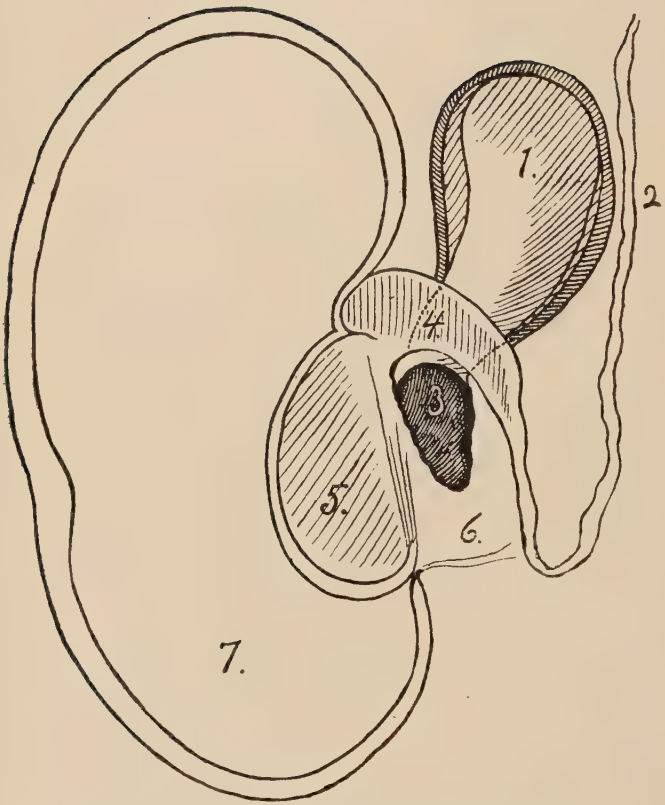
and the other below the level of the seat of the disease. In a limited sense this application relieves the diseased joints from the weight of the body, while the patient is up and about because antero-posterior pressure thus applied transfers a part of the weight and concussion incident to standing and walking from the diseased bodies of the vertebræ to the processes, which remain sound. Having thus (1) removed as far as is practicable injurious pressure from the diseased structures, it is obvious that we have also applied the most effective kind of retentive splint for (2) the arrest of motion in the affected joints.

It does not take much practical experience to convince one that efficient pressure applied in this manner is productive of good. It may not at once arrest morbid action and induce cicatrization of the carious bone. For these events we must wait for the natural reaction, but it is not difficult to believe that nature will the more promptly intervene with reparative efforts if our mechanical applications relieve distress and substitute a feeling of strength for weakness and apprehension. A well applied support at once gives a degree of relief which finds plain expression in the face and attitude of the patient. As a matter of fact, a feeling of security and comfort is afforded by the use of a corset made from any of the materials in ordinary use. I will not indicate the defects of apparatus of this kind. The inexpensiveness of jackets, and the ease with which they can be obtained and applied, make them of the greatest service to a vast number of patients who otherwise would have no mechanical support whatever. But when, and where it can be done, it is necessary to give the patient the benefit of accurately adjusted antero-posterior pressure.

At the best, antero-posterior pressure, no matter how carefully applied, fails to give all the support which is desirable. This is because the leverage is deficient. In the vertebral column there is found no long, bony lever, such as is at hand in making a mechanical application for fixing the knee. There is rather a succession of irregular bones movable upon each other, which, from the nature of the case, impair the success of any attempt to arrest motion or support the column by pressure from behind forward and counterpressure from before backward, because the pressure from before backward will, a part of it at least, be expended in bending backward portions of the vertebral column above and below the projection. The force thus employed is, however, by no means wasted, as it secures an ultimate improvement in the shape of the trunk, which is often characteristic of patients who have been thus treated.

The apparatus needed is essentially simple, consisting of two parallel uprights united below by a pelvic band, and diverging at their upper ends at the base of the neck, and curving over the tops of the shoulders. Pressure from behind forward is made by two pads attached to the uprights at the level of the projection, and applied a short distance from the median line on each side. Counterpressure from before backward is made below by a strap passing from one end of the pelvic band to the other in front of the pelvis, and above by straps, one on each side, passing from the upper end of the upright through the axilla to be buckled to the upright. The most important feature of a brace constructed to carry out these views is the use of mild steel for all the metal parts. The use of this material puts in the hand of the surgeon the power to modify the degree and direction of pressure to the changing shape, and to meet the increasing tolerance of the skin to pressure. The reaction of the skin should receive special and constant attention and gentle and gradually increasing pressure should be made till the limit of comfortable tolerance is reached.

By patient attention to details, apparatus thus designed may with certainty be made comfortable and efficient. The diffused support furnished by a jacket is often secured by the addition to the simple lever described above of aprons and other pieces which add to the feeling of stability and security without interfering with the chief function of the apparatus which is to make antero-posterior pressure. One hardly knows where to begin and where to end in the consideration of the



1. Sac situé en arrière de la grande vaginale et au-devant des éléments du cordon.
2. Canal déférant.
3. Orifice d'entrée du sac diverticulaire.
4. Tête d'épididyme.
5. Coupe du testicule.
6. Vaste espace ovalaire entre l'épididyme et le testicule.
7. Coupe antéro-postérieure destinée à montrer les rapports du sac secondaire avec les autres organes.

details which demand attention in practice of this kind. I will close by saying that cheapness and cleanliness may be promoted by leaving the steel parts of this brace unpolished and covering them with a single layer of adhesive plaster and then with strips of Canton flannel or silk cut bias, and renewed without much trouble as often as may be desired.

OBSERVATIONS CHIRURGICALES.

Par le Docteur LÉON AUDAIN,

Ancien Interne en Médecine et en Chirurgie des Hôpitaux de Paris, Membre correspondant de la Société anatomique de Paris, Membre du Jury médical central de la République, etc.

HYDROCÈLE À DOUBLE SAC SUPERPOSÉ SUIVANT LE PLAN ANTÉRO-POSTÉRIEUR.

Au point de vue clinique, l'examen du malade n'offrait rien qui put faire soupçonner la particularité dont il était l'objet. Le scrotum présentait seulement une dépression médiane, transversale, comme on le voit souvent dans les hydrocèles volumineuses. Après l'incision de la vaginale, qui était très-épaisse et blanchâtre, nous aperçûmes entre l'épididyme fortement déjeté en dehors et le testicule un orifice à bords froncés. L'introduction du doigt nous permit de constater que cet orifice était extensible et pouvait laisser passer jusqu'à deux doigts et nous permit également de reconnaître l'existence d'une poche remontant jusqu'au niveau du canal inguinal. Nous avions donc en présence deux poches bien distinctes: l'une formé par la grande vaginale, et l'autre par un développement très-considérable d'un cul-de-sac rudimentaire à l'état normal. La grande poche offrait des parois épaisses, blanchâtres, rugueuses; la seconde, au contraire, avait les parois souples et glissait facilement en arrière de la précédente dont elle n'était séparée que par une faible épaisseur de tissu cellulaire. Le fond du sac ayant été accroché par le doigt, nous pûmes, en l'attirant, la retourner comme un doigt de gant et l'emmener à dehors. Nous constatâmes alors que la muqueuse dont elle était tapissée offrait un aspect rosé, contrastant singulièrement avec la précédente. Une incision circulaire faite au niveau du collet de ce sac, en respectant naturellement le testicule et l'épididyme nous permit de la détacher avec facilité. Les deux lèvres furent rapprochées au moyen d'anses de catgut et l'opération fut achevé suivant les procédés ordinaires.

Cette particularité est intéressante et n'a pas été, jusqu'ici, que nous le sachions, ni représentée, ni décrite par les auteurs. Le Professeur Tillaux, dans son traité d'anatomie topographique, nous dit que peut-être, dans certains cas d'hydrocèle, ce cul-de-sac se trouverait distendu. Ce prolongement considérable du cul-de-sac épididymo-testiculaire ne ressemble en rien aux hydrocèles diverticulaires de Béraud, dans ces dernières, les sacs étant situés sur un même vertical et n'a rien non plus de commun avec les hydrocèles en bissac. Nous nous félicitons d'avoir, dans ce cas en particulier, employé la méthode de la cure radicale de l'hydrocèle, car nous avons obtenu une guérison radicale par première intention, et sans nul doute la récidive se fut montrée si nous avions employé la ponction suivie d'injection iodée. Dans ce cas, en effet, après l'écoulement du liquide contenu dans les deux sacs, l'orifice du sac postérieur, revenant sur lui-même et la main qu'on place d'ordinaire au niveau de la région inguinale, comprimant la partie supérieure de ce sac, la teinture d'iode n'aurait pas pénétré dans sa cavité. Nous sommes, du reste, partisans de la cure radicale, car elle offre sur l'autre méthode des avantages incontestables; absence de douleur post-opératoire, rapidité plus grande de la guérison, garantie plus considérable au point de vue de l'avenir. Disons, en outre, que ce malade, ayant été opéré quelque temps après d'une autre hydrocèle, et s'étant marié quelques mois plus tard, sa femme ne tarda pas à devenir enceinte. Ce fait est en contradiction avec l'opinion générale que les malades, porteurs d'hydrocèles volumineuses et anciennes comme le nôtre sont souvent inféconds.

ANGIÔMES.

Nous avons eu occasion d'opérer une enfant de huit mois de deux angiômes: l'un situé à la paroi abdominale, au niveau de la région sus-ombilicale, l'autre, au cuir chevelu.

Nous croyons devoir communiquer au Congrès cette observation à cause de l'innocuité absolue de ces sortes d'opération, lorsqu'on a soin d'appliquer, dans toute sa rigueur, l'hémostasie préventive. Ces angiômes avaient l'un et l'autre les dimensions et la forme d'une grosse prune allongée; ils étaient entièrement sessiles.

Pour réaliser l'hémostase préventive, deux tiges de trocart ayant été placées perpendiculairement l'une à l'autre, au-dessous de la base de ces tumeurs nous enserrâmes cette base fortement dans une anse de crin de Florence. Pour que l'hémostase fut encore plus complète, une aiguille armée d'un fil double fut passée au-dessous de ce lien circulaire et deux autres anses de crin, appliquées au-dessous de la précédente.

Les tumeurs furent alors incisées dans toute leur longueur, suivant le grand axe, jusqu'au contact des tiges de trocart. Il ne s'écoula que le sang qui avait été emprisonné dans ces tumeurs par la constriction de leur base. Elles furent enlevées par morcellement dans leur totalité. Cette méthode d'hémostasie préventive, combinée au morcellement (méthode du Docteur Péan, de Paris), comme on peut le voir dans la thèse que nous avons l'honneur de présenter au Congrès, rend d'incontestables services.

RÉSECTION PARTIELLE DE L'URÉTHRE.

Nous avons eu occasion de pratiquer chez trois de nos malades (hommes) la résection partielle de l'urèthre pour rétrécissements anciens et étendus qui avaient résisté jusqu'alors à tous les procédés opératoires.

Chez notre premier malade (observation No. XXII) l'urine s'écoulait en totalité par une fistule du périnée. Après ablation de la fistule et des tissus fibreux du périnée, la paroi antérieure de l'urèthre fut ouverte et réséquée sur une étendue d'environ deux centimètres et demi. Une sonde ayant été introduite dans la vessie, les tissus mous du périnée furent soigneusement réunis au catgut en deux plans superposables. Un troisième plan, constitué par la peau, fut suturé au crin de Florence. Pour éviter la formation de clapiers, nous eûmes soin de faire cheminer les crins de Florence presque dans le voisinage de la sonde intra-urétrale de façon à enserrer dans leurs anses les trois plans formés. Ces crins furent enlevés du troisième au huitième jour et nous obtînmes une réunion par première intention, sauf à la partie tout à fait antérieure de la plaie, où pendant une dizaine de jours il s'écoula quelques gouttes d'urine. La sonde ayant été laissée à demeure pendant environ une vingtaine de jours, la fistule se tarit d'elle même.

Dans l'observation No. LXXIII notre conduite a été à peu près la même; mais outre la résection partielle du canal uréthral, nous dûmes faire une petite opération supplémentaire pour corriger une déviation de l'urèthre dans la région bulbaire. L'axe prolongé du bout antérieur passait à quelques millimètres de l'axe prolongé du bout postérieur. Ces deux bouts étaient rejoints par un coude très marqué au niveau duquel existait un rétrécissement extrêmement serré. Après avoir incisé ce rétrécissement à sa partie antérieure, nous dûmes tailler, dans le bulbe même, sur le prolongement du bout antérieur, une sorte de coin à base superficielle. De l'autre côté nous fîmes une incision libératrice qui nous permit de fermer la perte de substance en coin et de corriger le coude que formait l'urètre. Cette bulboplastie nous a donné un bon résultat. La section du bulbe n'a donné lieu qu'à une hémorrhagie très faible, qui s'arrêta dès que les catguts furent placés. Le reste de l'opération est analogue à ce que nous avons décrit plus haut.

Dans l'observation No. LXXXIX le malade, atteint de rétrécissement uréthral d'origine blennorragique, portait de nombreuses fistules du périnée et une fistule vésico-abdominale dont le trajet sous-cutané rejoignait par les parties latérales du scrotum les fistules périnéales. Après ablation de cette fistule et de celles du périnée (grattage des fongosités et excision des parties fibreuses), nous arrivâmes, non sans difficulté, à reconnaître le canal uréthral. Celui-ci, ponctionné en un point accessible à la sonde cannelée, fut ouvert sur une étendue de six centimètres environ, d'avant en arrière (dans ces six centimètres se trouve compris le rétrécissement) long de deux centimètres et demi. Les parties fibreuses qui l'entouraient furent réséquées. Une sonde en caoutchouc rouge fut placée à demeure dans la cavité vésicale. La perte de substance fut si considérable que nous crûmes prudent de laisser la plaie se fermer par bourgeonnement. Les suites opératoires furent des plus simples. Les bourgeons charnus s'unirent peu à peu au devant de la sonde; le périnée se combla et deux mois après le malade repartit guéri pour son pays.

Comme particularité, il est à remarquer que la sonde laissée dans la vessie vingt-trois jours avant d'avoir été enlevée pour la première fois, n'offrait aucune infiltration calcaire ni aucune altération.

Cette pratique de résection partielle de l'urèthre n'est pas la nôtre. Nous l'avons vu maintes fois appliquer à l'Hôpital Necker (Paris), par Monsieur le Professeur Guyon et nous avons lieu de nous féliciter d'avoir suivi l'exemple du grand maître.

APPENDICITE ET PÉRIAPPENDICITE.

Notre observation No. CXXXI est celle d'un jeune homme de 22 ans qui est venu nous consulter dix jours après le début d'une maladie que nous reconnûmes être une appendicite et périappendicite perforante. La marche de la maladie ayant été assez lente, nous nous crûmes autorisé à patienter avant d'entreprendre l'opération. Cette conduite, qui est absolument contraire à la pratique américaine, mais qu'on préconise assez généralement en France, offre, croyons-nous, certains avantages. Le pus formé a le temps de se bien collecter; l'opération devient plus simple, moins longue et partout moins périlleuse pour le malade. L'habitude qu'ont certains chirurgiens d'opérer dans les vingt-quatre heures de la maladie ne saurait être posée comme règle générale; d'une part à cause de l'incertitude forcée du diagnostic, et d'autre part de la résistance qu'on trouverait dans la clientèle privée. Cette opération hâtive ne se comprend guère que dans les cas d'appendicite suraiguë. Lorsque la marche de cette affection est lente, les fausses membranes ont le temps de se produire, de s'organiser, isolant suffisamment la grande séreuse abdominale. Nous pensons néanmoins que le chirurgien doit être toujours prêt à intervenir en prenant pour guide la marche clinique de l'affection. Nous ne sommes cependant pas partisans d'une expectation trop prolongée, car il serait à craindre que la résistance de la paroi abdominale, étant plus forte que les fausses membranes, celles-ci ne vinsent à céder.

Dans notre cas l'opération eut lieu le dix-huitième jour de la maladie. La collection purulente faisait une saillie très nette sous la peau. Après incision de celle-ci et des couches musculaires au point d'élection, il s'écoula un flot de pus vert à odeur fécaloïde. La cavité de l'abcès offrait des parois irrégulières, anfractueuses, recouverts de fausses membranes très-résistantes, surtout au niveau de l'extrémité inférieure du cœcum. Elle fut lavée avec une solution phéniquée à 1 pour cent. Pendant le lavage nous vîmes sortir un corps étranger que nous reconnûmes être une graine de tamarin. Cette graine avait dû séjourner très longtemps dans le tube intestinal, car ses couches externes étaient fortement attaquées. Nous cherchâmes avec soin l'appendice, mais il fut impossible de le retrouver. Les muscles furent suturés au catgut et la peau au crin de Florence. Nous eûmes soin dans cette

dernière suture de comprendre également la couche musculaire. Un orifice de 5 centimètres environ fut laissé vers la partie moyenne de la plaie. La cavité fut saupoudrée d'iodoforme et bourrée de gaze iodoformée.

Les suites opératoires furent excellentes; le malade guérit en cinq semaines (du 3 mars au 10 avril 1893); il n'a plus ressenti aucune douleur abdominale ni aucun trouble intestinal.

SPINA BIFIDA DE LA RÉGION LOMBAIRE.

Méthode de l'excision après ouverture du sac.—Nous avons opéré le 24 octobre 1892 un enfant de huit jours, atteint de spina bifida de la région lombaire. Il avait à peu près le volume d'un œuf; ses parois étaient extrêmement minces, presque translucides, et l'on pouvait voir par transparence, dans la profondeur, des cordons noirâtres que nous prîmes pour des vaisseaux sanguins.

La tumeur était entièrement réductible; elle offrait à son point culminant une ulcération large comme une pièce de 10 sous. Il n'y avait aucune paralysie des membres inférieurs et aucun trouble de la sensibilité. Du côté de la tête, on constatait que les fontanelles antérieures et postérieures étaient énormes et qu'il existait entre les deux frontaux jusqu'à la racine du nez un sillon plus large qu'un travers de doigt. Étant donnés les caractères de la tumeur que nous venons de signaler, nous crûmes que nous nous trouvions en présence d'un spina bifida simple, de ce spina bifida que l'on se croirait autorisé à traiter par l'excision après ligature de la base. Bien nous en prit d'avoir préféré, à cette méthode et à la ponction suivie d'injection iodée, l'excision après l'ouverture du sac. En effet, cette tumeur, malgré sa parfaite réductibilité, contenait le cordon médullaire, et, circonstance plus sérieuse encore, ce cordon adhérait à la peau sur une étendue de plus de 2 centimètres.

La moelle fut disséquée de ses adhérentes et réintroduite dans la cavité vertébrale. Les méninges exubérantes furent réséquées et suturées au catgut. Un second plan de sutures au crin de Florence réunit la peau. Nous ne fîmes pas de drainage. Le lendemain l'enfant mourut d'une complication hydrocéphalique.

Le résultat fâcheux n'est pas pour faire repousser la méthode de l'excision après ouverture du sac, méthode qui a été si remarquablement défendue dans la thèse de notre collègue, Monsieur Bellanger, de Paris. Quelle que soit la méthode employée, les statistiques sont toujours mauvaises. Dans ce cas, il nous paraît préférable de recourir à celle qui nous offre le plus de garantie, qui est la moins aveugle et partant la plus rationnelle.

KYSTE DERMOÏDE DOUBLE DE L'OVAIRE ET KYSTE PARA-OVARIQUE CHEZ UNE HERMAPHRODITE.

Notre malade est une femme de 29 ans, de forte constitution, réglée depuis l'âge de 15 ans, mais d'une façon très imparfaite. Les règles, après une courte apparition, disparaissaient parfois pour ne plus se montrer que plusieurs mois, voire même une année plus tard. Les allures de notre malade sont celles d'un homme; elle a une forte moustache, une barbe épaisse (qu'elle a soin de raser); les seins sont peu développés, la poitrine, l'abdomen et les cuisses couverts de longs poils.

Du côté des organes génitaux, on constate que rien de particulier n'existe du côté de la vulve et du vagin, mais le clitoris offre un développement très exaggéré (longueur, 3 centimètres; grosseur d'un doigt; gland bien formé). L'urèthre occupe son siège normal. En pratiquant le toucher, on constate une atrophie très marquée du col de l'utérus dont on devine l'existence par une saillie circulaire au centre de laquelle on trouve un petit orifice. Au spéculum, nous n'avons jamais pu arriver à le saisir. Depuis quatre à cinq ans la malade s'est aperçue que son ventre grossis-

sait. Lorsque nous l'examinâmes, il nous fut facile, par les caractères cliniques qu'offrait cette tumeur, de diagnostiquer un kyste dermoïde de l'ovaire.

Cette malade fut opérée le 23 mai 1893. L'incision s'étendait du pubis à deux travers de doigt au-dessus de l'ombilic. Après la section du péritoine nous découvrîmes une tumeur d'aspect rosée, rémittente, que nous ponctionnâmes. Il s'écoula environ 1 litre de liquide clair comme de l'eau de roche. Une ponction plus profonde amena environ 6 litres d'un liquide noir. Après avoir attiré au dehors les parois du kyste, nous extrayâmes de l'abdomen une tumeur solide, volumineuse, située sur la partie latérale gauche de l'utérus. Cette tumeur se continuait avec le ligament large par un pédicule de 20 centimètres de large. Nous fîmes la section de ce pédicule au-dessus de deux pinces; nous sectionnâmes également le pédicule du kyste para-ovarique dont la longueur était d'environ 10 centimètres. Nous pratiquâmes ensuite la ligature en chaîne de ces deux pédicules.

Du côté droit, nous découvrîmes une troisième tumeur du volume du poing d'un adolescent, extrêmement adhérente au grand épiploon. Son extirpation n'eut pas été impossible, mais l'opération ayant déjà duré quatre heures, nous crûmes prudent de ne la point tenter, estimant que le chirurgien, dans le pays où la grande chirurgie n'est pas acclimaté, où le moindre insuccès est commenté outre mesure et considérablement augmenté, est tenu à une réserve plus grande. Dans le cas présent, nous nous trouvions encouragé par ce fait que les gros dermoïdes de l'ovaire sont et que celui-là avait peut-être déjà acquis son maximum d'accroissement.

Les suites opératoires furent excellentes, la plaie se réunit par première intention et la malade guérit. Cette opération est intéressante: 1° Par l'existence d'un double dermoïde, fait relativement peu commun. 2° Par l'existence d'une troisième tumeur (kyste para-ovarique). 3° Par l'énorme volume de l'une des dermoïdes; celui de gauche contenait 6 litres de liquide, et la partie solide, formée de cheveux, de dents, de matières huileuses, de mastic, etc., pesait plus de 2 kilogrammes. 4° Par l'hermaphrodisme. Il est permis de se demander si l'existence d'une double tumeur dermoïde de l'ovaire, en altérant, dès l'ère embryonnaire l'organe principal du sexe n'a pu faire dévier ce sexe vers l'autre et donner lieu, par conséquent, à l'hermaphrodisme. Nous croyons qu'il serait cliniquement intéressant de rechercher si, chez les individus qui présentent des traces d'hermaphrodisme, il n'existe pas des kystes dermoïdes doubles de l'ovaire de volume plus ou moins considérable.

INSTILLATIONS INTRA-UTÉRINES DANS LE TRAITEMENT DES ENDOMÉTRITES.

Nous avons eu occasion, dans le cours de ces deux années de pratique chirurgicale de faire cinq curettages pour cas graves d'endométrite sans lésion des annexes (endométrite chronique suppurative et hémorrhagique du corps et du col).

Dans tous ces cas nous avons obtenu des résultats extrêmement satisfaisants: les écoulements purulents ou hémorrhagiques et les douleurs disparurent; bien plus, plusieurs de nos malades (observations VI, XCIV, CXV) devinrent enceintes. L'une d'elles (observation VI), accouchée à terme d'un enfant bien constitué; la seconde, chez laquelle il existait une antéversion bien marquée, eut une grossesse gemellaire qu'elle ne conduisit qu'au troisième mois, faute de précaution; la troisième est actuellement au cinquième mois d'une grossesse qui semble évoluer normalement. Donc 60 pour cent de nos curettées ont conçu peu après l'opération.

Il n'est pas dans notre idée de ressusciter la vieille lutte des partisans du curettage et des cautérisations escharrifiantes au chlorure de zinc. Nous croyons que chacun de ces procédés a des indications absolument spéciales et que c'est au chirurgien de savoir s'il doit curetter ou cautériser. Nous voulons seulement attirer l'attention sur un procédé qui, nous le croyons, est nouveau et qui dans l'espèce nous a rendu les plus grands services: les instillations intra-utérines.

Les instruments à l'aide desquels nous procédons sont les suivants: la seringue à instillations de Guyon pour uréthrite postérieure et la sonde à instillations du même auteur.

Le manuel opératoire est extrêmement simple: Après antisepsie de la vulve, du vagin, application du spéculum et antisepsie du col de l'utérus, on saisit la sonde à instillations avec une pince longue et dirigeant son extrémité dans la cavité cervicale on pousse lentement jusqu'à ce que l'on sente la résistance du fond de l'utérus. Pour éviter l'introduction de l'air dans la cavité utérine, on a eu soin, avant cette petite manœuvre, de placer la sonde au bout de la seringue à instillation et de faire jaillir une certaine quantité de liquide. Lorsqu'on a atteint le fond de l'utérus, on instille quelques gouttes de solution; puis tirant la sonde de quelques millimètres, on fait une nouvelle instillation, et ainsi de suite, jusqu'à ce que la sonde sorte de l'utérus.

Dans nos cinq cas de curettage ce procédé a toujours été employé. Il offre surtout dans les cas de déviations utérines un avantage considérable sur les autres procédés de nettoyage, d'antisepsie et de cautérisation de la cavité utérine; la muqueuse n'est jamais blessée, l'introduction est facile, rapide et non douloureuse. A la suite de l'opération du curettage, nous avons l'habitude, ainsi que cela se pratique d'ordinaire, de laisser en place le premier pansement pendant quatre jours. C'est donc le cinquième jour que nous pratiquons la première instillation.

Avant de la faire, nous avons toujours soin de pratiquer avec une sonde à instillation un peu grosse une instillation préparatoire au sublimé ou à l'acide phénique afin de débarrasser la cavité utérine des débris de muqueuse, des caillots et des mucosités qu'elle peut renfermer. Nous pratiquons, alors seulement, une instillation de nitrate d'argent à 1 pour cent (environ 3 grammes). Nous répétons tous les deux jours les instillations en élevant de plus en plus les doses suivant la tolérance des malades: ainsi la deuxième instillation est de 1 pour 80, la troisième 1 pour 60, jusqu'à arriver à 1 pour 10. Nous les supprimons alors et nous nous contentons de faire faire matin et soir une injection antiseptique. Les suites de cette petite manœuvre sont simples. La femme ressent pendant un quart d'heure à deux heures quelques légères douleurs au bas ventre. Nous avons été amené à employer des doses progressivement élevées parce qu'ayant instillé d'emblée une injection à 1 pour cent, nous eûmes une congestion utérine violente avec perte de sang pendant plusieurs heures. En dehors du curettage, les instillations intra-utérines, faites de la même façon, nous ont données d'excellents résultats dans plusieurs cas d'endométrite passibles du traitement médical. C'est surtout dans ces derniers cas que l'on reconnaît les avantages des instillations.

Les cavités du col et du corps n'ayant pas été préalablement dilatées comme dans le curettage, il est à souhaiter que ce procédé si comparable aux instillations uréthrales soit essayé par les gynécologues.

ANÉVRISME DE LA FÉMORALE.

L'observation de notre statistique où il s'agit d'un anévrisme de la fémorale par balle de revolver offrait ceci de particulier:

L'anévrisme était extrêmement volumineux (le volume de la cuisse avait doublé); les orifices d'entrée et de sortie étaient le siège d'une suppuration assez abondante.

Après la ligature de la fémorale au-dessous de l'arcade de Fallope, ligature rendue pénible par l'existence de nombreux ganglions dans la région et de volumineux trousseaux fibreux; les battements, le souffle disparurent immédiatement. On pouvait être tenté à ce moment de désinfecter les orifices d'entrée et de sortie de la balle et de laisser la tumeur sanguine se résorber; mais nous crûmes plus prudent d'ouvrir largement le foyer hémorrhagique afin de réaliser une antisepsie plus parfaite.

A peine la plaie eut-elle été débarrassé des caillots, qu'il se produit une hémorrhagie extrêmement abondante dont nous ne pûmes nous rendre maître qu'en plaçant dans la profondeur quelques pinces à mors longuets. L'hémorrhagie s'était-elle produite par le bout inférieur de la fémorale ou par quelques branches profondes? Nous ne saurions le dire. Nous n'eûmes qu'à nous féliciter de la conduite que nous avions tenue; car les pinces ayant été laissées en demeure quarante-huit heures (hémostasie définitive), il ne se produisit aucune hémorrhagie secondaire; et la plaie, bien aseptisée, guérit avec rapidité.

Par la suite, il se produisit une légère escharre du talon, qui guérit à son tour; et depuis longtemps le malade a repris, sans claudication, l'usage se son membre.

DES MOUVEMENTS MUSCULAIRES DE LA PAROI ABDOMINALE SIMULANT LES MOUVEMENTS FŒTAUX.

Dans le cours de notre pratique en Haïti nous avons eu l'occasion d'observer très fréquemment des cas de grossesse imaginaire due, chez des femmes nerveuses, à une adipose rapide des parois abdominales; mais un cas, entre tous, attira notre attention.

Il s'agissait d'une jeune femme dont les parois abdominales étaient moyennement épaisses et qui nous affirma avec la plus grande énergie être enceinte depuis deux ans, n'avoir jamais vu depuis cette époque ses règles et sentis, d'une façon indubitable, les mouvements du fœtus.

Cette femme avait eu déjà deux grossesses. Nous crûmes, à cause de la durée de la grossesse, à une grossesse imaginaire.

Nous fîmes coucher notre malade sur le lit d'examen, et après avoir noté que le ventre avait un certain développement, nous plaçâmes la main sur l'abdomen. Grand fut notre étonnement, lorsque nous sentîmes des mouvements absolument comparables à ceux du fœtus dans les derniers mois de la grossesse. Nous pratiquâmes le palper abdominal. Pas de tumeur. Par l'auscultation, nous entendîmes des battements fréquents; mais ceux-ci sont isochrones au pouls de la mère.

Le palper abdominal, combiné au toucher vaginal, nous montra que l'utérus avait sa forme et ses dimensions normales.

Après avoir laissé cette femme pendant environ un quart d'heure sans la toucher, nous plaçâmes de nouveau la main sur le ventre et nous constatâmes que ces mouvements étaient produits par une contraction brusque et énergique de la paroi abdominale de haut en bas.

Ce petit fait est cliniquement intéressant, car tout pouvait faire supposer à la malade qu'elle était nullement enceinte.

Et nous nous étions contenté d'un examen superficiel en nous basant sur l'un des meilleurs signes de la grossesse: le mouvement du fœtus, nous eussions commis une grave erreur.

La malade partit allégée de ses craintes et de ses espérances.

OBSERVATION D'UN HOMME QUI S'EST TIRÉ DANS LA BOUCHE UNE BALLE DE REVOLVER.

Le 21 mars 1892 nous fûmes appelé à donner des soins à un homme qui venait de se tirer une balle de revolver dans la cavité buccale. Bien que la perte de sang eut été considérable, le blessé avait conservé toute sa connaissance, mais ne pouvait répondre que par signes à nos questions.

Ses lèvres étaient tuméfiées; sa langue portait dans sa moitié droite un sillon profond qui se perdait vers sa base.

La langue ainsi que le palais offraient une coloration noirâtre due à la poudre. Impossible de suivre plus loin le trajet de la balle.

En examinant le cou du malade, on pouvait constater que du côté droit il existait une tuméfaction considérable sans dureté. La carotide battait régulièrement ainsi que la temporale. Pas de troubles dyspnéiques. Devant ces signes nous portâmes un pronostic favorable; comme unique traitement, nous prescrivîmes un lavage fréquent de la bouche avec une solution phéniquée à 1 pour cent.

Au bout de quelques jours la tuméfaction commença à diminuer et toute la région put être explorée sans grande douleur. Il existait cependant un point dans le voisinage de la bosse occipitale externe où la douleur était vive. Nous glissâmes le doigt sur le cuir chevelu et nous sentîmes un corps dur. C'était, nous le pensions, la balle qui s'y était logée.

Le 18 avril les plaies buccales étant complètement guéries, la tuméfaction cervicale ayant disparu, nous résolûmes d'inciser le cuir chevelu et d'aller à la recherche de la balle. L'incision, ayant une forme légèrement convexe en haut, était parallèle à sa partie moyenne, à la crête occipitale.

Le cuir chevelu, ayant été mobilisé sur une étendue de 8 centimètres environ, nous constatâmes qu'au-dessus du tendon du trapèze le corps dur était inégal. Ce tendon fut sectionné au niveau de la crête osseuse.

La pince à balle, introduite par l'orifice cheminant parallèlement à la face externe de l'occipital, rencontra á 0.01 de profondeur ce corps dur, qui fut facilement pris et extrait. C'était bien la balle, comme nous l'avions pensé. Son calibre correspondait au No. 9 du revolver. Les faces étaient aplaties et offraient des raillures dans le sens du grand axe de la balle; et, en plaçant la pointe de la balle dans la position qu'elle devait avoir dans le moment où le coup avait été tiré, on pouvait constater que cet aplatissement correspondait à la partie interne de la balle. Il nous fut possible alors de reconstituer le trajet qu'elle avait dû suivre avant de se loger à la place où nous l'avions trouvée. Après avoir parcouru la cavité buccale d'avant en arrière, elle a dû se heurter à l'apophyse basilaire ou au corps des premières vertèbres cervicales, contourner leurs apophyses transverses et cheminant entre les masses musculaires du cou les gros troncs vasculo-nerveux sans les atteindre et gagner la face externe de l'occipital; et delà suivre cette face externe jusqu'au niveau de la crête occipitale externe.

Cette observation est cliniquement intéressante en montrant d'une part l'inutilité des recherches et des extractions immédiates des balles, et de l'autre, l'efficacité des moyens antiseptiques pour prévenir la suppuration des épanchements sanguins même lorsqu'ils se trouvent au contact avec des cavités, telle que la bouche où pullulent les microbes.

La plaie se réunit par première intention, et huit jours après le malade était totalement guéri.

TRAUMATISMS AND TRAUMATIC ANEURISMS OF THE VERTEBRAL ARTERY AND THEIR SURGICAL TREATMENT, WITH THE REPORT OF A CURED CASE.

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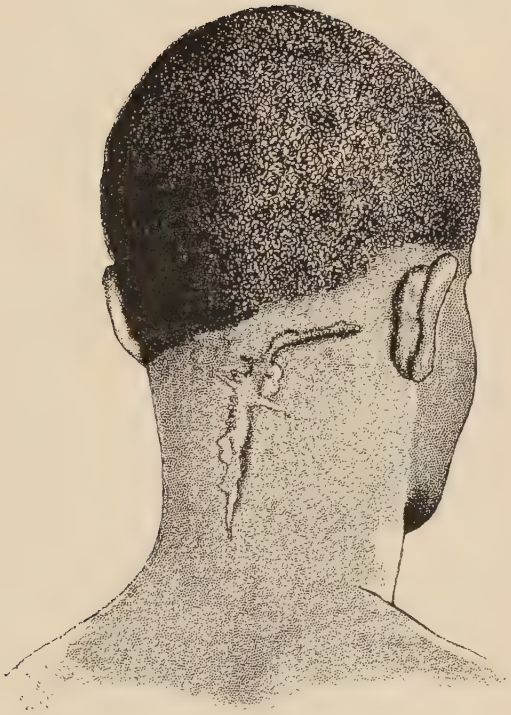
I.

The operative surgery of the vertebral artery may be truly said to be an acquisition of the latter part of this century. Up to 1860, but a few names would have sufficed to cover the whole bibliography; the names of Dietrich, Velpeau, Nunziante Yppollito, Sédillot, Fraeys, Chassaignac, Landi, and Maisonneuve would have completed the list of the most important authors who have given any personal attention to the subject. The majority of the great writers of the period referred to, such as



MATAS—LINE OF SCAR RESULTING FROM THE INCISION IN CASE OF TRAUMATIC ANEURISM OF THE VERTEBRAL ARTERY.

A. Cooper, Lisfranc, Larrey, Vidal, Malgaigne, Guérin, Béraud, and Follin, taught practically that the vertebral artery was of scarcely any interest to the surgeon.

The spirit of the times was reflected by Sanson, of Paris, in his treatise on traumatic hæmorrhages, which was published in 1836. In commenting upon a case of injury to the vertebralis, he said:

The vertebral artery can not be ligated, on account of its great depth, nor compressed, because of the osseous canal which protects it; it can still less be cauterized. The wounds of this vessel are beyond the resources of art.

In 1853, the accomplished Maisonneuve * proved that this teaching was erroneous, for, in a remarkably daring search (for the period it was a very bold feat) for the bleeding vessel in a wound of the neck, he, aided by Favrot, successively ligated the inferior thyroid and the vertebral as it entered the canal of the transverse process of the sixth cervical vertebra. This had never been done before, and the gravity of so unparalleled a procedure as the ligation of the vertebral artery can be gleaned from Maisonneuve and Favrot's report, when they say, with a solemnity which sounds somewhat strange to our *fin de siècle* surgery: "It was suspected that the hæmorrhage came from the vertebralis. In the presence of so grave a contingency, for the relief of which the records of surgical experience suggested no remedy, we hesitated, and for a moment felt uncertain as to the proper plan of action. But the life of the patient was involved and we had to stop the hæmorrhage at all hazards." And this they did admirably and with perfect success.

We find that as early as 1833, Velpeau † suggested that the ligature of the vertebralis, in its first portion, was a feasible operation and could be effected by an incision in the space between the sternal and clavicular heads of the sterno-cleido-mastoid, as previously suggested by Sédillot for the ligation of the common carotid. Dietrich,‡ in 1831, proposed two methods for the ligation of the upper part of the vertebralis, one for tying the artery in the occipito-atloid region and the other in the atlo-axoid, or first intertransverse space. In 1834, Respoli,§ of Naples, while witnessing the ineffectual efforts that were being made by a colleague (Ramaglia's case), to control the bleeding from a stab wound of the vertebral artery, suggested that this vessel should be ligated en masse by passing a curved needle through the bleeding intertransverse space, thus inclosing all the soft parts within the ligature.

In 1835 Nunziante Ypolito,‖ who had also had personal experience with the difficulties in the way of completely controlling the bleeding in injuries of the vertebral artery, concluded, after an able study of the subject, that the ligation of the vertebral in its first portion was perfectly justified for the control of hemorrhage, and that a ligature could best be thrown around it by making an incision on the outer border of the sternomastoid. Unfortunately, he had no experience on the living subject with his method, though it was almost identical with the procedure independently adopted by Smythe, of New Orleans, in his memorable case, and which is now frequently referred to as "Alexander's method."

In 1848, Fraeys, ¶ of Gand, described a method of securing the vertebral by making

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* Maisonneuve and Favrot: Journal des Connaissances Médico-Chirurgicales, Paris, 1852, 2e s., Vol. II, p. 181.

† Velpeau: Nouveaux Éléments de Médecine Opératoire, Paris, 1839, T. 2me, p. 221.

‡ Dietrich: Das Aufsuchen der Schlagadern, etc., p. 81, 1831, Nuernberg. *Vide* also Chelius's Surgery.

§ Respoli: Quoted by Nunziante Ypollito, Annali Clinici, Napoli, 1835. Also in pamphlet on Ligatura dell' Arteria vertebrale nei casi di aneurismi della stesa, 1838. Also quoted by A. Gherini in memoir on Ferité dell' Arteria Vertebrale, Milano, 1867.

‖ *Vide supra, loc. cit.*

¶ Smythe's operation was performed as follows: The head of the patient was thrown backward and turned slightly to the left, an incision 2 inches long was made from a little above the clavicle along the posterior border of the sternomastoid muscle. The edge of the muscle having been exposed and drawn aside, the prominent anterior tubercle of the transverse process of the sixth cervical vertebra was readily felt and taken for a guide, the artery lying vertically below it. A layer of fascia was divided, some loose cellular tissue with lymphatics and the ascending cervical artery was pulled to

an incision on the inner border of the sternomastoid, which was very much enriched by the admirable topographical suggestions of Chassaignac, whose masterly studies on the importance of the anterior tubercle of the sixth cervical vertebra as a guide in this operation, caused it to be named after Chassaignac rather than in honor of its true originator—Fraeys.

Finally, the lamented Barbieri, of Milan, whose "Monograph on the Vertebral Artery" will ever remain an imperishable monument to his prodigious erudition, summarized, in 1867, all the arguments in favor of the ligation of the vertebral and laid down all the details of the technique for its typical ligation, in ignorance, however, of the successful demonstration of the practicability of this operation on the living subject that had been given to the surgical world in 1864 by Andrew W. Smythe, of New Orleans. This operation is the most towering landmark in the surgical history of the vertebralis, and in conjunction with the first successful ligation of the innominate artery for the cure of subclavian aneurism, with which it was performed as an auxiliary measure, is justly recorded in the classics as one of the most brilliant achievements of American surgery.

The operation performed by Smythe, although classical, deserves more than passing mention, because it was the first systematic and carefully premeditated, as well as successful, attempt to control the vertebralis at the point of election in the root of the neck. The object of the ligature of the vertebralis was, in this case, to cut off the collateral supply from the circle of Willis to a subclavian aneurism.

The patient was William Banks, a mulatto, aged 32 years, who consulted Dr. Smythe for the relief of an aneurism of the right subclavian artery, which filled the posterior-inferior triangle of the neck, and which had resulted from muscular strain in the efforts made by the patient to save himself from drowning in a collision at sea. On May 15, 1864, a silk ligature was placed on the innominate artery, a quarter of an inch below its bifurcation and another ligature was also applied to the common carotid an inch above its origin. Repeated and profuse secondary hemorrhages took place at various intervals, which threatened the life of the patient, as in all previous cases in which the ligature of the innominate had been attempted, and in spite of the ingenious method of hæmostasis resorted to by Dr. Smythe, viz, the filling of the bleeding wound with fine shot. In view of the impending danger, and being satisfied that repeated occurrence of the bleeding in the fatal cases of this operation could all be accounted for by a retrograde current through the vertebral, the hemorrhage coming directly from the brain, the bold operator decided to ligate this all-important collateral. He says:

> Having satisfied myself by repeated attempts on the subject that the vertebral artery could be ligated just before it enters the foramen of the sixth cervical vertebra, through an incision made along the outer edge of the sternomastoid muscle, and the aneurism having diminished enough in size to permit of the operation, I determined to try it, and, on July 8 (fifty-three days after the ligation of the brachiocephalic), with the assistance of Dr. P. C. Boyer, a ligature was placed on the vertebral artery.*
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> No further hemorrhage took place. The ligature came away from the vertebral artery on the tenth day, and on the 15th day of September the wound had healed and the first successful typical ligation of the innominate and vertebral arteries recorded in the annals of surgery was an accomplished fact.

After the publication of Smythe's brilliant operation, the ligation of the vertebralis soon became one of the classical acquisitions of surgery, especially since the safety of the aseptic procedure has been so frequently demonstrated in the heroic but ineffectual attempts to cure epilepsy by the ligation of both vertebrals, as first

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the inner side of the scalenus anticus and longus colli muscles which were separated from each other close to their insertion into the tubercle, when the artery and vein became visible. The vein was drawn to the outer side (a point of importance, according to Dr. Smythe), and the needle was passed round the artery from without.

* New Sydenham Society's biennial retrospect for 1885–'86. From N. O. Medical Record and Mott's Velpeau, Vol. II, p. 229; also New Orleans Charity Hospital report for 1876.

practiced by Alexander, of Liverpool, who alone operated 36 times with only 3 deaths, and who has been followed by Bernays, of St. Louis, Chalot, of Toulouse, France, and others.

II.

The class of injuries which are about to engage our attention are fortunately of great rarity *—fortunately indeed, for when they do present themselves for treatment they are well calculated to cause no little worry to the surgeon whose judgment, courage, and resources are usually taxed to the utmost by a combination of complications and obstacles that experience teaches are thrown in the way of his curative efforts in a manner that is hardly paralleled by any other class of vascular injuries. It is hardly necessary to dwell long upon the reasons for the peculiarly grave character of the traumatisms that involve the vertebral artery. A glance at the surgical anatomy of this vessel as it lies deeply hidden in the skeleton of the neck, only escaping at very short intervals from its osseous canal to become immediately invested by very important and vital cervical nerves as they issue from the spinal foramina, will at once remind us of the magnitude of the purely technical difficulties in the way of its atypical ligation and of the errors of diagnosis that must be incurred, owing to the proximity of so many large arterial trunks.

Furthermore, its unique termination in the cranial cavity, where, anastomosing directly with its fellow artery, it becomes continuous with the carotid system through the circle of Willis—will also convince us of the unreliability of the ligation of this artery, whether proximately or distinctly applied, as a permanent means of controlling the blood supply of any aneurismal tumor that may be situated between either one of its cervical extremes.

One of the initial difficulties that are usually presented by aneurisms of the cervical portion of the artery is that of their differential diagnosis from similar tumors connected with the carotid trunk and its branches. That this difficulty is not fanciful but real is most eloquently proved by the fact that in more than 16 out of 36 traumatisms of the vertebral artery (or 44⅔ per cent) hæmostasis was attempted by ligation of the common carotid as the presumed source of hemorrhage. In these cases either the carotid alone or together with some other artery (the inferior thyroid, Maisonneuve; the occipital, Fenger) was ligated first instead of the culprit vertebral, the error being recognized only *post operationem*. The necessity for correct differentiation is, therefore, manifest, and its importance can not be overestimated, especially when we consider that the ligation of the common carotid under these circumstances is fraught with especially harmful consequences. As Timothy Holmes † correctly stated:

In the first place, by throwing the strain of the anastomosing circulation on the vertebral it tends to aggravate the disease it was meant to cure, and in the second, if the circulation in the wounded vertebral artery is interrupted before the operation (which to some extent it almost certainly must be), the stoppage of the supply from the carotid artery is rendered doubly perilous to the nutrition of the brain.

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* Some idea of the comparative rarity of the wounds of the vertebral can be obtained when we consider that in the sixty years that have elapsed from the foundation of the New Orleans Charity Hospital, from 1832 to 1892, during which period 463,894 patients have been treated within its walls, but one case of wound of the vertebral has been recorded in the annual reports, and that was the traumatic aneurism that came under my observation, and that has been described in this paper at some length. Stone's case was treated in his private infirmary, and would be the second recorded case from New Orleans up to 1893.

In consulting the surgical history of the war of the rebellion, second volume, we find that out of a total of 2,235 cases of arterial hemorrhage of head, neck, chest, trunk, and upper and lower extremities in which the bleeding vessels were indicated by name, only two cases (one a primary injury, the other a secondary) are attributed to the vertebral (Table C, XXIV). These hemorrhages were furnished by a grand total of 245,790 gunshot wounds and 922 saber and bayonet wounds which were inflicted during the civil war from 1860 to 1865.

† Surgical treatment of aneurism in its various forms, London Lancet, July 26, 1873.

The explanation of the frequency with which this error of ligating the common carotid for the vertebral has been committed is solely to be accounted for by the topographical relationship between the two arteries, and the facility with which pressure upon the common carotid at the root of the neck will control the circulation of the vertebral. This fact was distinctly pointed out by Fraeys, of Ghent, in 1848,* and can be easily demonstrated by repeating this observer's experiments on the cadaver. "After having removed the skull cap and the contents of the cranium, taking care to cut the vertebral arteries below their junction in the basilar, tie the axillary arteries and the upper part of the abdominal aorta, then inject water through the arch of the aorta. The liquid will be shot out through the two internal carotids and the two vertebrals at the base of the skull. But as soon as even slight pressure with the finger is put on the course of the common carotid, in the space extending between 2 or 3 inches above the clavicle, between the trachea and internal border of the sterno-mastoid, the jet will no longer flow from either the internal carotid or vertebral, on the side compressed, but will recommence as soon as compression is removed. If both sides are compressed at once all the arteries cease to squirt. If pressure is made with the same force on the common carotid above the "carotid tubercle" (i. e., the anterior tubercle of the transverse process of the sixth cervical vertebra), the space below that tubercle being left free, the jet from the internal carotid wholly ceases."

As stated by T. Holmes,† the surgeon who, knowing the true position of the transverse process of the sixth cervical verteba, and knowing that pressure applied along the course of the carotid anywhere below this, i. e., for 2 inches, at least, above the clavicle, will most probably stop the pulsation in the vertebral also, will not conclude that the aneurism affects one of the carotids, or some branch of the external carotid, until he has seen that pressure also stops the pulsation when applied on a higher level, or when applied to the carotid by lateral pinching of the sheath through the relaxed sterno-mastoid muscle, as recommended by Rouge, and effectually practiced in the case here reported.

The importance of Rouge's lateral method of compression should not be forgotten, when we consider that the vertebral not infrequently takes an anomalous course in front of the vertebral column, and avoids the sixth transverse process to enter into a transverse foramen much higher up, selecting even that of the third and second vertebræ. Under these circumstances direct compression backwards upon the common carotid, no matter how high above the carotid tubercle, would be sure to compress the vertebral, as well as the common carotid arteries, and thereby make the experiment fallacious.

Another lesson that is reenforced by experimental evidence is the demonstration of the great freedom of the collateral circulation of the vertebral through the circle of Willis. If the vertebral be exposed through its whole length in the neck by laying open the vertebro-transverse canals with a costotome and gouge forceps, and the artery be divided in the middle of its course, an injection of water into the aorta will immediately cause a flow through both the divided distal and proximal ends by streams of equal size and velocity. If a separate receptacle is attached to each end of the divided artery, both will fill up at the same time, proving that the supply of blood from the distal and proximal end is simultaneous and practically equal. The bearing of this experiment upon the treatment of traumatic aneurism by the ligation of the vertebral trunk at its origin is obvious.‡ No definitive cure could always be expected by such a procedure, since the supply from the cranial side would be as great as from the proximal side; the only rational hope for success by systematic

*Annales de la Societe de Medecine de Gand, 1848, p. 211, Vol. XXI.

†Loc. cit.

‡In cases of wounds of the vertebral in which the artery has been completely divided, both ends of the artery may bleed with equal vigor, as, e. g., was well demonstrated by Kocher's patient (No. 15; Table II).

ligation would be to attempt the combined ligation of the distal end, in the suboccipital triangle, by Dietrich's method, and that at the proximal end by either Smythe's or Alexander's method. But the ligation of the vertebral artery on the distal side in a case of traumatic aneurism is not only impracticable but tantamount to the Antyllian operation, for in the vast majority of cases the aneurism already occupies the suboccipital space, and the artery can only be secured by the incision and evacuation, or displacement of the aneurism. The cases of aneurism, in which the tumor occupies a region far enough from both the points of election to make the ligation practicable, have not yet presented themselves, and it is probable that such a procedure will never be realized, or if it is at all carried into execution, it is very doubtful that it will be associated with less traumatism than that which is connected with a direct attack upon the aneurismal sac by any of the modifications of the method of Antyllus.

So much, therefore, for the *a priori* experimental and anatomical evidence. Let us now listen to the teachings of experience.

III. Remarks on Primary Bleeding from Injuries of the Vertebral Artery.

It is impossible for us to draw any definite and safe conclusions as to the best course to pursue when confronted by so grave an injury as a wound of the vertebral artery without consulting the lessons of the past and gathering from all reliable sources those teachings of actual clinical experience which are most rational and have furnished the most salutary results. To satisfy my own inquiries I have searched all the available literature at my command for reports of cases, and have succeeded, with the valuable assistance of the distinguished librarian of the Surgeon-General's Office, Dr. Billings, in collecting 53 cases of the lesions of the vertebralis.*

These observations I have grouped in three tables, thus: Table I, in which only endo-cranial aneurisms of the vertebralis are considered. They number eleven cases. Table II embraces only the extra-cranial or cervical aneurisms. They number 20 cases. Table III is a collection of wounds or lesions of the artery, involving its surgical or extra cranial portion. This embraces 22 reported cases.

We are at once forcibly struck by the great mortlaity of this class of injuries, for out of a total of 53 cases we find that 45 died in direct consequence of the lesion of the vertebral artery or complicating circumstances associated with it.

We should at once eliminate the table of endo-cranial aneurisms, as these lesions were all, with one exception, of purely pathological interest, having resulted from degenerative changes in endo-cranial arteries and appertaining to a domain entirely foreign to our present subject. We will only add that all these cases, without exception, ended fatally—100 per cent.

Of the 20 cervical aneurisms which are grouped in Table II 6 recovered, leaving a mortality of 70 per cent for this class of injuries. These aneurisms were all traumatic with the exception of case No. 7, which was reported by Stubbs. In Table III, which exhibits the nonaneurismal injuries, 22 in number, we find that all but 3 were the result of traumatisms, chiefly stab, punctured or gunshot wounds. We note that of these 22 cases only two recovered, leaving a mortality of 90 per cent for the nonaneurismal traumatisms. If we add the 19 wounds of Table II, which gave rise to the 19 traumatic aneurisms and the 22 nonaneurismal wounds of Table III, then we will have 41 cases of wounds, with a total morality of 80.69 per cent, and a percentage of recoveries equal to 19.31 per cent, which gives a more approximate idea of the general results of the traumatism of this dangerous artery.

We notice that in all the tables the males have preponderated by a large majority.

As to age we note also that while the endo-cranial or pathological lesions of the vertebral occurred in subjects averaging 39.10 years of age, the traumatic aneurisms presented themselves in patients averaging 22.10 years.

* I have references to several other cases, but they are so lacking in detail they are useless for purposes of study or tabulation.

In considering the influence of the weapon with which the injury was inflicted, on the career of the case and the final mortality, we observe that 14 out of 21 punctured or stab-wounds terminated in 14 traumatic aneurisms, and that only 4 out of 14 gunshot injuries terminated in aneurisms. One man who was gored by an ox (Pirogoff's case) died from an aneurism of the vertebral, resulting from the injury. Two deaths, which were caused by erosion of the vertebralis by tubercular abscesses, terminated without aneurismal formation, and another pathological erosion of the artery (Küster's case) terminated by cerebral and other complications, after the bleeding had been permanently controlled, without aneurismal formation.

This would seem to indicate that while the final mortality is practically the same for either class of injuries (stab and punctured, 79.16 per cent, and gunshot injuries, 78.14 per cent), there appears to be greater prolongation of life after stab and punctured injuries than after those caused by firearms. This must be due to the multiple and more complicated character of the injuries caused by the last class of weapons, which often end the life of the patient too soon to allow of the provisional hemostasis implied by an aneurismal formation.

If we now investigate the immediate causes of death in the 43 tabulated cases of injury of the vertebralis, we will readily recognize five essential factors which, in the order of their frequency and importance, I would put down as follows: (1) Hemorrhage; (1) shock; (3) sepsis; (4) exhaustion; (5) cerebral complications.

Very rarely did one of these conditions alone cause death; almost as a rule, the fatal result was due to the association of two or more of these lethal elements.

In the majority of the cases hemorrhage was the dominant factor; in some cases alone, but usually combined with one or all the other conditions. In at least 35 per cent the hemorrhage was not definitely controlled before the other complicating elements fatally closed the career of the cases. It is nevertheless an encouraging fact that in as many as 20 out of the 43 tabulated wounds of the vertebral, or nearly one-half of the traumatisms, the physiological resources of nature, with very little external aid, were sufficient to control the primary bleeding from the artery and circumscribe it within the limits of an aneurismal cavity. It is probable, indeed, that in the simplest or least complicated types of this injury the primary hemorrhage from the bleeding artery can be controlled by the natural methods of hemostasis, if only aided by some comparatively simple external treatment—such, for instance, as superficial pressure over the wound applied digitally, by suturing the wound, or by bandaging or plugging it externally.

This is conclusively proved by the case reported by L. Stromeyer,* which is worthy of citation here:

A soldier was wounded in the neck in the battle of Idstedt, July 25, 1850. He was taken to Gottorp, near Schleswig, where Dr. Herman Schwartz extracted the ball, which could be distinctly felt in the nucha. News came that the battle had been lost, and to avoid capture the patient fled on foot 8 miles to Kiel, where he died on July 29, four days after the injury, with meningeal symptoms. At the autopsy it was found that the ball had penetrated the right cheek half an inch from the angle of the mouth, going inward in the direction of the posterior wall of the pharynx. It grazed the tongue, barely touched the internal carotid, and, after penetrating the posterior pharyngeal wall, fractured the transverse process of the first cervical vertebra, lacerating the vertebral artery at this point and lodging finally under the skin of the suboccipital region.

The absence of hemorrhage in this case is remarkable, and the explanations given by the findings in the autopsy by Prof. Webber, of Kiel, are worth noting. He says:

The wounded vertebral had not bled and was not likely to bleed. The two divided extremities had completely retracted; the upper end was cut on a level with the transverse process of the atlas; the lower end, much retracted, was filled with a resistent thrombus an inch and a half in length. There was no notable extravasation of blood in the vicinity; the upper end was likewise completely plugged with a thrombus.

* Maximen der Kriegs Heilkunst, Hanover, 1861, pp. 443–553; also by Pirogoff in his Kreigs Chirurgie, 1864, p. 563.

It is true, nevertheless, that in the majority of the cases, or at least 50 per cent, the conditions of the wound, or rather its complications, are such that the natural hemostatic process is entirely insufficient, even in a merely provisional sense, and that surgical assistance of the most determined and skilled sort must be immediately appealed to if danger to life from hemorrhage *alone* is to be averted. If we now analyze the table of 22 cases of wounds which did not become aneurismal, we will observe that in some the hemorrhage was so sudden and profuse that death came on before any skilled assistance could be rendered; in others, and these were more numerous, the fatal hemorrhage was never controlled, even when the patients were opportunely taken to hospitals or to competent surgeons.

As has already been stated, in over 44 per cent of the injuries of the vertebral artery in which any surgical treatment was attempted, errors of diagnosis were almost invariably committed, so much so that in 16 out of 36 cases the common carotid artery was ligated by mistake. This error was always of very serious consequence, for it not only increased the shock by adding to the traumatism, but it aggravated the hemorrhage by increasing the strain on the vertebral circulation, and, furthermore, greatly increased the risk of secondary cerebral complications.

It must be stated also that from the standpoint of hemostasis alone the cases in which the injury to the artery has been inflicted through the mouth are of still greater gravity, especially if the bleeding is taking place in the pharynx, where it is almost impossible to control the bleeding orifice by plugging it or by other direct procedures. This is well shown by case 2, Table III, reported by L. J. Sansom.*

In July, 1830, an adult male was admitted in the Hotel Dieu, of Paris, to be treated for a gunshot wound in the head and neck. The ball had penetrated by the right nostril, had fractured the palate, and was lost in the pharyngeal region. Slight bleeding had taken place from the nose and throat immediately after the injury, but it had stopped spontaneously. About the tenth day after the affair very abundant hemorrhage took place. The course and track of the bullet did not lead the attendants to suspect a lesion of the vertebral. A wry neck had supervened, but it was attributable to independent causes. Preparation was made to ligate the carotid, but the patient died before the operation could be attempted. At the autopsy it was discovered that the ball had fractured the transverse processes of the upper cervical vertebra, and had injured the vertebral in its course.

The fatal cases reported by Voisin, Thurot, Kade, and Peters emphasize the fact that the syncope and exhaustion of surgical anemia from frequently repeated and profuse hemorrhages of the vertebralis, is to be regarded as of primary importance in influencing the mortality.

In all wounds of the vertebralis there is always a certain amount of shock, which varies in intensity with the extent, importance, and multiplicity of the structure involved, and shares the responsibility, equally with hemorrhage, in determining the final issue, or may even exceed it in importance.

This is especially true of the cases of injury of this artery in which death is practically instantaneous.

Types of this class are the cases reported by Jolly, of Clermont, France; Carter, of Bombay; and Saviotti, of Milan.

In Jolly's case (a wound in the neck caused by the penetration of a load of wadding from the discharge of a pistol loaded only with powder), death was instantaneous. The autopsy revealed that the transverse processes of the second and third cervical vertebræ had been torn away *en masse* and that the fourth had been fractured into fragments. The vertebral artery was completely torn away; a terrific hemorrhage had taken place through the wound and the spinal meninges were exposed and covered with clot.

In Saviotti's case, a man aged 30 years was stabbed in the neck. He fell almost unconscious immediately, but shortly after the injury he picked himself up and succeeded in dragging himself up to the stairway of the Ospidale Maggiore of Milan, where he dropped dead as he attempted to ascend the stairs. In the autopsy it was discovered that the fatal wound had completely severed the vertebral artery in the inter-transverse space between the third and fourth vertebræ. An extensive extrav-

* Des Hæmorrhagies Traumatiques, Paris, J. B. Bailliere, 1836, p. 352, 8vo.

asation about 12 centimeters in length filled up the retro-pharyngeal space and pressed important structures.

In Carter's case, a native Naique policeman, aged 25 years, was stabbed in several places by another policeman and died about one hour after sustaining his injuries. In this case the vertebral artery had been severed in the inter-transverse space between the third and fourth cervical vertebræ. Here the phrenic and other structures had been injured.

In another group of cases we find that while the patients have survived the primary hemorrhage and shock, the repeated bleeding from the vertebral and a septic condition of wound, which is maintained by the manipulation and the various styptic and other applications that are made to the wound with a view of controlling the hemorrhage, finally exhaust the vitality of the sufferer and cause death by the combined influences of anemia, shock, and exhaustion.

The observations reported by Barbieri and Monti, Prichard and Pirogoff, illustrate the characteristics of this group.

Another group is distinguished by the most fatal form of complication, viz, a disturbance in the cerebral circulation and secondary encephalic lesions from septic causes—such as cerebral embolism, meningitis, softening, etc. Typical examples of this group are: Stromeyer's case, already cited, in which meningitis carried away the patient after the hemorrhage from the wounded vertebral had been completely controlled, four days after the injury. Maisonneuve and Favrot's remarkable and now celebrated observation in which we notice that, after a most laborious and intrepid search, these operators ligated the vertebralis and arrested an obstinate hemorrhage from a stab wound of the neck,* only to lose the patient one month after the operation from septic cerebral embolism, due to infection of the wound. The case of Watson, in which the jugular and common carotid were ligated and the subclavian was compressed for a complicated vertebral hemorrhage. The patient rallied after a most terrific ordeal and was apparently going to improve, when cerebral symptoms set in, and the patient died in coma, three days after the injury.

Still another group of cases may be separated from the others, in which the distinctive feature lies in the pathological orgin of the injury to the vertebralis. In these cases the artery is eroded by perivascular suppurative foci, usually tubercular, sometimes septic, and always secondary to other traumatisms or diseases.

Typical of this group are the cases reported by Perrin, Neuretter, Van Buren, and Küster. This is an essentially unfortunate group as far as the ultimate prognosis is concerned, for the vertebral injury is usually the last act of a long tragedy. The patients are generally exhausted by long-existing disease or extensive traumatisms to the cervical skeleton, and when the hemorrhage comes there is little strength and vitality left in the patient to stand any further drafts on their blood supply or their nutrition. Küster's case is especially interesting in this group, not only as a type of the condition referred to, but also because it occurred in the practice of an eminent contemporary surgeon, who was able to cope with the difficulties in his way with the resources of modern surgery. His case is also one of the few in which the hemorrhage from the bleeding vessel was permanently controlled, and, although the patient finally died from cerebral disturbance, the method pursued in controlling the bleeding artery is worthy of remembrance in the treatment of similar cases.

Observation.—A dyspeptic female, aged 35 years, very marasmic and addicted to morphine, developed a tubercular abscess of the neck, on a level with the fourth cervical vertebra. The patient's condition was so unfavorable that Küster declined to open the abscess. As the abscess threatened to burst spontaneously and hectic began to manifest itself, he decided to open it. After extirpating the walls of the sac, he discovered a sinus which could be traced to one of the transverse processes and which had to be dilated with a dressing forceps. This allowed the finger to detect the exposed portion of the second cervical vertebra, which was loose and necrosed. The sequestrum was pulled out with forceps, but at that instant a stream of arterial blood poured out of the wound, which was quickly stopped by the immediate reintroduction of the finger into the sinus. After a short delay the finger was

* In this case the vertebral was ligated *in situ* for the first time in the history of surgery.

partially removed and the blood again poured out. It was now evident that the arteria vertebralis had been injured. As the strength of the patient did not allow of any loss of blood, no further experiments were tried with the finger, but in its stead a tampon of iodoform gauze was introduced and insinuated until it was firmly packed in the corresponding intertransverse space. The hemorrhage then stopped at once and never returned. A compressing bandage around the head and neck added to the secure retention of the plug. The tampon was allowed to remain ten days. When removed it had a distinct odor of iodoform and the wound was entirely free from inflammatory reaction. In the meantime diverse disagreeable symptoms had developed, which were at first attributed to iodoform poisoning. On account of this sublimate gauze was substituted for the iodoform, temporary improvement followed, but vomiting and cerebral symptoms ensued, which terminated by the sudden death of the patient nineteen days after the operation. The autopsy revealed an aseptic wound in the neck and complete laceration of the vertebralis in the transverse process of the axis, but both ends of the divided artery were effectually closed with a strongly adherent thrombus, showing very advanced organization, the lower of which extended 3 centimeters and the upper extended to the level of the foramen transversum of the atlas.

Setting aside the explanation of the manner of death, which, as the author says, might not be quite simple, we learn from this observation that an iodoform tampon can effectually and permanently arrest a hemorrhage from an artery of the caliber of the vertebralis, and remain in place for ten days without calling forth local disturbances. This is the essential feature of the modern antiseptic tampon, as contrasted with the plug used by the older operators, who not only used materials that were far from being aseptic, but actually saturated this material with styptic agents which irritated the wound and favored the development of septic suppuration, thus interfering with the proper organization of the clot.

The great value of the tampon, especially the aseptic or antiseptic tampon, systematically applied in the very depths of the wound and directly against the bleeding point in the arterio-vertebral canals, in permanently arresting vertebral hemorrhage, is not only demonstrated by Küster's case, but is still more strikingly emphasized by the fact that in the only 2 cases of primary vertebral hemorrhage that recovered, out of the 22 collected cases, the only agent employed was a tampon. In J. Mason Warren's case ordinary sponges were first used and subsequently sponges dipped in styptic solutions, and in King's case oiled lint and graduated carbolized compresses were used; if we add that 3 of the 6 traumatic aneurisms (see Table III) that recovered, were also saved by systematic plugging of the bleeding orifice, making in all 5 out of the 8 permanent recoveries in the whole collection of 43 injuries that are due to plugging, we will appreciate still more forcibly the value of the tampon as a hemostatic agent. We shall again refer to this invaluable aid in the treatment of vertebral hemorrhages when we reach our practical conclusions.

We must now hasten to the consideration of the traumatic aneurisms of the vertebral artery, which we have separated in a distinct group of 20 cases for special consideration.

IV. Traumatic Aneurisms of the Vertebralis.

While a traumatic aneurism of the vertebral artery is only a sequel to the primitive injury that originated it, the clinical difference between a primary bleeding wound of this artery and the false aneurism that may follow it is of sufficient practical importance in the treatment to justify a separate consideration of the two conditions.

While a traumatic aneurism may develop so promptly after an injury, and the extravasated blood may diffuse itself so rapidly and widely that immediate surgical action may be demanded for the salvation of the patient, it is the rule that the concealed and progressive hemorrhage which causes the aneurismal state is so well circumscribed by the resistant perivascular tissues that a temporary respite is given to the patient, and more time is gained by the surgeon for deliberation and the application of conservative measures of treatment. It is by this delay, which gives time

for preparation, that the prognosis is improved and the ultimate chances of recovery are increased in traumatic aneurism.

If we now inquire into the facts of clinical experience, we will again observe that while the prognosis of traumatic aneurism is always very grave, that the number of recoveries is greater than in the primary bleeding injuries of this artery, for, in a tabulated record of 20 reported cases of traumatic aneurism, 6 patients recovered, or 30 per cent, while in a collection of 22 primary nonaneurismal injuries only 2 recovered, or 9.2 per cent, which would result in a difference of 20.+ per cent in favor of the traumatic aneurisms.

We have already stated that in a collection of 31 reported cases of aneurism of the vertebral artery gathered up to 1893, 20 were cervical and 11 intra-cranial. We need not again refer to the intra-cranial for the reasons previously given, but referring to the 20 cervical aneurisms we will observe that 14 were caused by punctured wounds, 4 by gunshot injuries, and 2 were not specified. In 11 out of 20 cervical aneurisms of the vertebral, the common carotid artery was ligated by mistake, and in a large majority the initial curative efforts were directed toward the control of the carotid circulation. Finally, of these 20 cervical aneurisms only 6 recovered.

These 6 successful cases are most instructive and interesting from the standpoint of surgical therapeutics, and deserve individual mention. Chronologically we will consider them as follows:

Observation No. 1, by Mœbus:* On December 27, 1827, the author was called to attend a man, aged 23, who had been stabbed in the neck, and who was apparently dying from hemorrhage. The patient was almost pulseless and bathed in a profuse icy perspiration. The wound had ceased to bleed spontaneously when M. arrived. The wound was situated in the inferior right half of the occipital region, and was directed downward and forward in the direction of the mastoid. It measured 2 inches and 3 lines in depth. A firm plug or compress was packed into the depths of the wound, and the plug held in place by a firm bandage. Ether, opium, and cinchona were administered to restore the patient.

The patient improved steadily until the fifteenth day, when secondary hemorrhage took place from the wound, which had not yet completely healed, but this was arrested by firm pressure. On the seventeenth day a pulsating tumor the size of a bean was detected at the wound; an alum solution was directly applied to the bottom of it, with the help of a firm compress, and bandaged. On the twenty-seventh day the tumor was very much larger in spite of local astringent applications and ice poultices, which were now applied for the first time. The tumor soon measured 5½ by 4¾ inches in size. The diagnosis of vertebral aneurism was made after testing the effect of pressure on the carotid circulation. An operation was proposed, but patient would not consent to it. Ice poultices were now constantly applied, while the patient was kept in bed. On July 26, or about fifty-nine days after the injury, the tumor became perceptibly harder, and the pulsations diminished. Improvement rapidly followed, and by March 6 the patient was entirely well.

This case, therefore, demonstrates that a traumatic vertebral aneurism may be completely controlled by cold, direct pressure, and general as well as local rest, which were the only therapeutic agents resorted to by the medical attendant.

Observation No. 2, Warren Stone,† New Orleans, La.: A negro slave, aged 30 years, was brought to Stone's Infirmary five months after he had been stabbed in the left side of the neck. He bled profusely at the time of the affray, but the hemorrhage was arrested. A swelling commenced soon after, which gradually increased "until the integuments were about to give way." A careful examination showed that the carotid artery and jugular vein were not wounded. Auscultation gave no sign, and Stone came to the conclusion "that either the external jugular vein or one of the cervical arteries had been wounded." He says: "I concluded to open the tumor, empty the sac, and secure whatever had been wounded. The opening was made, when a small portion of the coagulum was discharged and a sudden gush of arterial blood took place. I placed my thumb upon the carotid artery, but with no effect; the incision was enlarged, the whole coagulum was forced out, and it was found that the vertebral artery had been wounded. For a moment a finger was thrust between the transverse processes, by which means the violence of the bleeding was con-

* Graefe's and Walther's Journal, Vol. XIV, p. 98.

† New Orleans Medical and Surgical Journal, Vol. I, p. 555, 1849.

trolled. Lint was stuffed in place, granulations shot out luxuriantly, filled up the wound and plugged up the wounded artery." The patient was shortly after discharged, entirely well, from the hospital.

This is the first recorded case in which operative interference in a traumatic aneurism of the vertebralis was followed by recovery.

Observation No. 3, reported by Th. Kocher,* Berne: A. S., 42, was wounded three weeks before admission to Kocher's clinic. He had been stabbed four times in different parts of the body, a wound in the neck being considered the only serious one of the four. Examination revealed a wound between the fifth and sixth cervical vertebræ to the left of the spinal column. The wound had not healed kindly, and it was for this reason that the patient consulted Kocher. Upon raising the scab that covered the granulations, the wound bled. The introduction of the finger excited a more considerable arterial hemorrhage. The index finger was reintroduced its whole length into the wound, and easily penetrated through a semisolid mass of coagula until it touched the posterior surface of the transverse process. As the finger failed to arrest the hemorrhage, the wound was enlarged 3 inches, and a quantity of coagulated blood was expelled. The exploring finger now discovered a spacious cavity, the size of a small apple, in the deeper parts of which the transverse processes of the vertebræ could be felt. After enlarging the wound the interior of the cavity could be easily inspected. It was then discovered that the bleeding came from the intertransverse space between the fifth and sixth transverse processes of the cervical vertebræ. A strong arterial stream from the lower and another of equal size from the upper foramen in the transverse process poured out of the wound. Pressure applied to either orifice controlled the bleeding. A ligature could not be applied to the divided artery because of its retraction to the level of the vertebral orifices, and there was nothing to hold the thread. For this reason a round charpie plug, the size of a pea, which had been previously dipped in a perchloride of iron solution, was introduced into the upper and lower vertebral arterio-transverse orifices and tightly packed into the osseous canals. Hemorrhage was immediately and perfectly arrested. A firm compress was applied, and the head was immobilized with a stiffened cravat to secure absolute rest to the wound. The plugs were removed four days after their introduction, and no hemorrhage followed.

Erysipelas set in, however, but it was subdued with turpentine, and the patient finally completely recovered and was discharged about five weeks after admission.

Observation No. 4, reported by Christian Fenger,† Chicago: G. C., a male cook, aged 19, robust and well nourished. Had always enjoyed good health until January 6, 1881, when, while intoxicated, he was shot in the neck with a 32-caliber revolver. A large stream of blood spouted from the wound, and in fifteen minutes his face, around the lower jaw, became so swollen that he was unable to open his jaws for more than half an inch. On admission to the Cook County Hospital an external bullet wound was found to exist an inch external to the left of the posterior nuchal median line, on a line with and 2 inches behind the mastoid. There was great swelling of the corresponding side of the face and neck, showing great interstitial effusion of blood. Five days after admission, while straining a stool, the patient felt something give way behind the angle of the jaw. This was followed by intensely agonizing pain, accompanied by decided pulsation in the left sub-auricular region. Four days later a decided aneurismal bruit was detected over this. As there could be no doubt of the existence of a traumatic aneurism at this point, Dr. E. W. Lee ligated the left common carotid artery. The patient felt well with the exception of a slight headache and slight sensation of pulsation below the left mastoid process. No aneurismal bruit was detectable on stethoscopic examination.

Three days subsequently, while undergoing cross-examination in court, the sensation of pulsation increased, and, on return to the hospital, a decided thrill, but no bruit, could be detected behind and below the left mastoid process. "By February 9 the pain and pulsations had markedly increased. As it was obvious that a traumatic aneurism had recurred and was endangering life, I decided to make the radical operation, and began by securing the external carotid. An incision was made, 3 inches in length, along the entire upper half of the sternomastoid; the tissues were carefully separated; a careful watch kept for the pulsating vessels around the border of the pulsating tumor, with a view of ligating them before opening the aneurismal sac. When pulsation on pressure, in various places, had been apparently felt, and the aneurismal pulsation seemed to cease, an aneurism needle, armed with heavy aseptic silk, was passed successively around the area of the tissues involved, and ligature applied en masse, but in vain.

*Ueber Verletzung und Aneuryma der arteria vertebralis, nebst mittheilung eines glücklich verlaufen. Falles, Archiv. f. Klin. Chirurg., Berlin, 1871, Vol. XII, p. 867.

†Medical Standard, Chicago, March, 1887, Vol. I, No. 2.

I then determined to lay open the sac and catch up the supplying artery *in loco*. A transverse incision, 2½ inches in length, was made, extending from the upper end of the former incision backward from the mastoid process through the skin and insertion of the sterno-cleido mastoid, in order to secure the posterior occipital artery, possibly the source of the aneurism. On removal of the sterno-cleido mastoid the pulsations were more markedly felt. After a thin layer of the deep nuchal muscles had been cut through the aneurismal sac was opened and found filled with dark clots, on removal of which arterial blood spurted out. This hemorrhage could be controlled only by the pressure on the bottom of the cavity at its deepest part. The squama ossis occipitis was found denuded and in the internal wall formed by the atlas and axis some splinters of bone were felt. The tissues were cut through downward along the transverse processes of three or four cervical vertebræ and the whole sac laid open, which necessitated the removal of the upper fourth of the sternomastoid muscle. Artificial respiration and injections of whisky were required at this stage, as respiration had ceased. When the respirations again began search was made for the vertebral artery, which was finally taken up, at its curvature around the axis, and ligated. The bleeding stopped. The vertebral artery was nearly as large as the internal carotid. During ligation the respirations had stopped, and the patient was pulseless and seemed dead. After dressing the wounds, 8 ounces of defibrinated blood were transfused. The patient rallied rapidly, and on April 7 left the hospital entirely well. *

Observation No. 5. reported by Dr. Robert F. Weir:† On December 8, 1883, a man named Robert Adams, aged 28, was brought into my ward at the New York Hospital, having received a short time previously a stab wound in the right side of the neck from a knife held in the left hand of his opponent, who faced him when striking at him. The patient said he had bled very freely, but his clothes were not much stained with blood, nor was he weakened or exsanguinated. When first seen by the house surgeon no further bleeding was taking place from the wound, which was situated about three-quarters of an inch below the lobe of the right ear, and just anterior to the sterno-cleido mastoid muscle, transverse in direction and about half an inch in length. There was below this point and extending several inches downward an ovoid, soft, nonpulsating tumor, running and posterior to the mastoid muscle. All exploration of the wound was avoided and an iodoform dressing applied and secured by a compress and firm bandage.

December 10: Tumor has almost entirely subsided; wound nearly healed; patient yesterday afternoon suddenly experienced almost complete paralysis of sensation and motion of the left arm and hand; this was preceded by a "queer" confused, not painful, feeling in his head, momentary in duration; consciousness not lost.

December 15: Tumor has disappeared; wound entirely healed; paralysis is slowly disappearing; at a point 2 inches below and 1 inch posterior to lobe of right ear palpation discovers a faint pulsation slightly expansive in character, and on auscultation a slight bruit is audible.

December 25: Since the last record all the signs of aneurism have developed at the point indicated in last note; pressure on the carotid just below the level of thyroid cartilage does not affect the pulsation in the tumor, but pressure over the tubercle of sixth cervical vetebra controls it at once, nor does it react as long as the compression is continued. Ice bags and pressure were ordered to be applied alternately every three hours over the tumor.

January 1: The signs of aneurism, including pulsation, thrill, tumor, and bruit, are still more pronounced; no appreciable effect has followed the treatment by ice and pressure; the area of pulsation is now nearly 2½ inches in diameter; the paralysis of the left arm is becoming less marked.

January 3: To-day digital pressure was resorted to at the lower anterior edge of the aneurism, where yesterday it was found that compression arrested all pulsation; this was continued for seven hours by the house staff, assisted by relays of students; considerable force was necessary at first to control the circulation in the sac, which occasioned some pain and discomfort, and required morphia, gr. ⅓, hypodermically

* This is the first and only case in which the vertebral artery has been ligated in situ with permanent success in a case of traumatism or traumatic aneurism of this artery. Maisonneuve and Favrot, in 1852, were the first to ligate the artery in situ in a case of gunshot injury of the vertebralis, but the patient died seventeen days after the ligation of the artery of septic embolism. These are the only two recorded cases in which a ligature has been applied to an injured vertebral artery. Attempts have been made to ligate this vessel in situ in several cases mentioned elsewhere, but the local conditions and urgency of the symptoms compelled the operators to resort to immediate plugging or some other measure to arrest the bleeding. Fenger is in error when he says (*loc. cit.*) that his is the fifth case "in which vertebral artery ligation for a wound involving a traumatic aneurism of the vertebral artery has resulted in recovery." His was the second case of ligation, the others were simply illustrations of effectual plugging.

† Archives of Medicine, Vol. XI, No. 1, February, 1884.

to keep the patient quiet; no cerebral symptoms occurred at any time during pressure; after two hours there was great diminution in force of pulsation, and slight pressure controlled it without further discomfort to the patient; after three hours the pulsation could not be felt and all signs of the aneurism, save the resistance due to the tumor on palpation, had disappeared; pressure was continued lightly until 7 p. m. (in all seven hours), at which time a firm graduated compress was applied; no cerebral symptoms were noticed during the treatment; no return of symptoms; a solid tumor can be appreciated at site of aneurism; paralysis of arm has almost completely disappeared; general condition excellent.

January 12: Since last note patient has been up and about; no return of sign of aneurism; only a slight trace of the swelling can now be felt; the patient was to-day discharged from the hospital as cured.

This case, so happily terminated by a bloodless procedure, is especially interesting on account, not only of the variety of the mode of termination, but also because of the method employed, which is unique in the record of this class of arterial injuries.

Observation No. 6, by the author: Traumatic aneurism of right vetebral artery occupying the suboccipital triangle caused by gunshot injury and involving the artery in the atlo-axoid space. Incision; extirpation of sac; plugging of bleeding point; recovery. The patient, Vance J., is a bright mulatto youth, aged 21, a native of Louisiana, admitted to Ward No. 2, Charity Hospital, July 6, 1888. He states that about two months before admission he was accidentally shot in the back of the neck by another person who stood about 7 feet away from him, the injury being inflicted by a revolver (Smith & Wesson) which carried a .44-caliber bullet. He says that immediately after being shot he became paralyzed in his right arm and leg and also became quite numb in the corresponding side. His arm and leg were almost "lifeless," but about ten days after the accident he began to recover some control of his arm and hand and has been steadily improving since, so much so that now he can "use" his limbs almost as well as before the injury. He furthermore states that he bled very profusely from the bullet wound at the time of the injury and that he has bled more or less freely from it ever since. The orifice made by the bullet has apparently healed at various times, but it "broke" open again as often and bled each time profusely, so much so that he was so weak that he could only with great difficulty sustain the fatigue incident upon his travel to the hospital. These repeated hemorrhages alarmed him more than all his other symptoms and have caused him to seek the assistance of the hospital surgeons.

Status præsens: The patient is anæmic and his pulse is weak and compressible, it averages 100; temperature 99°. He was immediately put to bed and examined. A prominent pulsating tumor was at once recognized in the upper post-cervical region. The swelling is diffused in the right suboccipital space extending from the posterior border of the sternomastoid in front to the median line posteriorly. It reaches the inferior occipital curved line above and descends to the level of the fourth cervical vertebra below. A perforation in the center of a circular bluish cicatrical spot indicates the aperture of entrance. This opening is situated 3 inches below the external occipital protuberance and 1½ inches to the right of the same point and about 3 inches in a horizontal line behind the mastoid process. These measurements were taken with the head midway between flexion and extension. The pulsations of the tumor, which is diffusely spheroidal, are visible to the eye at a considerable distance and are associated with a moderate thrill on firm pressure. The swelling is reducible under firm pressure, though the pulsations are so strong that a 4-pound weight is easily lifted up and down synchronously with them. A very low quasi-placental bruit is heard over the tumor under stethoscopic examination. Firm pressure over the common carotid at Chassaignac's carotid tubercle (sixth cervical transverse process), sufficient to arrest all temporal pulsation, exercises no influence on the pulsations. Even very hard pressure below this point, with the view of controlling the vertebral, has little effect in arresting the aneurismal pulsation. Simple compression of the carotid above the tubercle of the sixth cervical vertebra had no effect in arresting the pulsations of the tumor. Rouge's method of compressing the common carotid by pinching the sheath between the thumb and index through the relaxed sternomastoid succeeded in arresting temporal pulsation, but had no effect on the aneurism. In view of this unequivocal evidence it was plain that the tumor was not connected with the carotid and that consequently it must be a traumatic aneurism of the upper vertebral artery (probably diffused), involving this artery shortly before its entrance into the cranium. My colleagues in the surgical service, Drs. Miles, Parham, Laplace, Chassaignac, and Michinard, who saw the case with me, likewise concurred in this opinion.

Treatment: The patient was at once put to bed and given the benefit of complete rest. He was informed of the nature of his condition in order that the necessity for

complete repose, especially of his neck and head, be more thoroughly impressed upon him. An ice bag was applied over the swelling.

On July 9, a 3-pound weight, wrapped up in cotton and gauze, was applied directly over the tumor and held *in situ* with an elastic (Martin's) bandage wound around the forehead.

July 10: Patient complained that the pressure of the elastic bandage was intolerable and that he could not stand it longer. The tumor pulsated almost as vigorously as ever, apparently unaffected. The elastic was removed and an ordinary roller gauze bandage substituted to hold the weight which was replaced over the swelling.

July 11: Patient can only stand the weight intermittingly; compelled to relieve him of the solid weight altogether, and substitute a bag of bird shot (No. 6) weighing 5 pounds, which is adapted much better to the contour of the swelling and causes less complaint. This weight the patient can stand, without the addition of retaining bandage, for one or two hours at a time, when he removes it and rests for half an hour or more. In the intervals of rest the ice bag is applied.

Thus far very little impression has been made upon the swelling. At times I fancy the pulsation is less vigorous. The dimensions and appearance of the swelling have certainly been unaffected. Patient complains of greater soreness and is growing tired of treatment.

July 13: Two long electrolytic needles are connected with the negative pole of a McIntosh 18-celled galvanic battery. The current furnished by 12 cells was applied; the needles were introduced as deeply as possible in the softest parts of the tumor. This application lasted about an hour without any very perceptible result when the needles were withdrawn. Ice bag and weight were continued intermittingly.

July 20: A marked change has taken place in the tumor since yesterday. The wound of entrance which, since the application of the shot weight had closed cicatricially, is now swollen and projects upward as a distinct conoidal swelling rising about 1 inch above the level of the tumor. Just in the center of this elevation, at the point corresponding to newly formed cicatrix, the skin is purplish and threatens to tear open at the least provocation. The tumor proper appears to be more diffused and pulsates vigorously, though not with so strong an impulse as on the day of admission. On the other hand the pulsating area appears to have been extended over a larger surface, so that it is now very close to the external occipital protuberance, and is advancing over the median line in spite of the natural barriers to further progress in this direction. The general appearance of the swelling indicates that it is ready to burst through the original wound, and in view also of the increasing restlessness and impatience of the sufferer it is plain that operative interference can not be deferred much longer. The direct compression of the tumor is now abandoned altogether, and I decided to run the risk of opening the sac with deliberation and thorough preparation rather than expose the patient to the great danger of accidental rupture without the benefit of immediate assistance. After preparing a considerable quantity of iodoform gauze and other antiseptic material that might be required in permantly packing the wound, I decided to immediately cut into the newly formed nipple-like swelling and then through it make a digital exploration of the interior. This acuminated point was, therefore, punctured; an opening, large enough to insinuate the index finger into the tumor, was made. A jet of dark serosanguinolent fluid shot out of the opening the moment the incision was made, and the pointed or nipple-like swelling collapsed. Before the index finger could be well introduced into the opening, the flow of the bloody fluid had entirely ceased, and it was evident, much to our surprise, that there was going to be no immediate hemorrhage. The cavity of the aneurism proper had evidently not been opened, and the teat-like swelling communicated only with an encysted bloody accumulation which had been emptied by the first incision. The tumor, however, continued to pulsate showing that the aneurism proper existed, but not so actively as before. I now proceeded to avail myself of the wound just made to explore the aneurism proper and to familiarize myself with its topography. I found that the newly enlarged wound of entrance led into a sinus that freely admitted the left index. The exploring finger could also be swept over and around a smooth, spheroidal, pulsating, and well-defined tumor, apparently about 2 inches in diameter The tumor appeared to be distinctly separated from the surrounding parts at its periphery, and gave the impression that it was a tense globiform sac. The free portion of the tumor appeared to be directed toward the suboccipital triangle, but it doubtless originated in the inter-transverse atlo-axoid space. Toward the mesial line it reached the ligamentum nuchæ, and upward it distinctly reached the inferior curved line which had been exposed by the dissection of the tumor. Further down, deeper than this, the finger could not explore without risk of injuring the sac. I was pleased to notice that, after the withdrawal of the exploring finger, no hemorrhage followed, showing that my fear of immediate rupture had been unfounded. Dr. Laplace was also able to confirm these topographical data by a cautious repetition of my exploration. By this oper-

ation we had obtained several important data: (1) The aneurism was not diffused, but distinctly circumscribed and was contracting. (2) Its topographical relation to the vertebræ and probable origin between vetebral transverse processes had been very approximately obtained. After consultation I decided to go no further, but to avail myself of the newly made opening to directly compress the aneurismal sac by carefully and systematically packing the sinus that led to it with iodoform gauze and then apply a firm compress and external retaining dressing. By this means I hoped to obtain a complete solidification of the contents or, in the event of failure to obtain this, to still further circumscribe the sac so as to enable me to reach the wounded artery more readily when attempting a radical operation at a later moment.

July 21: The patient was quiet and comparatively comfortable; the dressings were clean; no hemorrhage. The packing had evidently served its purpose well. I decided not to delay further action. The packing could not permanently remain in the wound, and, as it had to be removed at some early time, it was best to make a systematic and well prepared attempt to secure the wounded vessel outside of the sac by exposing the transverse processes of the vertebræ above and below the sac, and ligating it in the intertransverse space in the manner suggested by Gherini and Dietrich; or, in the event of failure to do this, to simply lay the sac open, following Sime's modification of the operation of Antyllus, then seek the bleeding orifices and plug them in the vertebral canals, as had been done successfully before by Lücke and Kocher in two similar cases. I was encouraged to believe in the feasibility of the first plan, viz, the ligation in the intertransverse spaces, because I had reason to suppose that the firm packing against the sac, which had been maintained during the preceding twenty-four hours, would have some effect in shrinking the tumer and probably solidifying it, thus permitting an unobstructed exposure of the transverse processes of the vertebræ and a comparatively easy dissection of the artery. I furthermore prepared to follow or expose the artery in case of need in the vertebral canals themselves by chiseling or biting off the transverse processes with rongeur forceps, which form the walls of the canal containing the artery, immediately above or below the sac. With this plan in mind the patient was brought to the amphitheatre, where, with the able assistance of several members of the staff, the operation was undertaken. After the removal of the dressings, excepting the plugs in the wounds, the parts were subjected to the usual antiseptic preparations, and the patient anæsthetized, and the wound of entrance at once enlarged by a longitudinal deeply made incision through the integument to the level of the sac, downward and parallel with the spine, about 4 inches in length, and then upward to the external occipital protuberance. When this incision was completed the globular surface of the aneurism could be distinctly seen as it projected upward, apparently partially released from the cramped confinement in which it had been held by the strong muscles (trapezius, splenius, and complexus) which covered it. The exposure of the tumor was now helped by an additional transverse incision, which, starting nearly at right angles from the vertical incision, extended outward through the thickness of the posterior cervical muscles to the mastoid, terminating on a level with the posterior origin of the sterno mastoid. This incision involved the occipital artery, which began to bleed profusely, but was promptly clamped, and gave no further trouble. By these two incisions a thick and triangular musculocutaneous flap was obtained which, when reflected downward, permitted a very clear view of the tumor, which at this juncture was seen pulsating, though very feebly as compared with its vigorous movements on previous days. This proved that the direct pressure, exercised by the packing, had been quite effectual in consolidating it. The exploring index, introduced at this moment in the depths of the wound, very readily circumscribed the tumor which appeared to spring up from the space between the atlas and axis, the transverse processes being readily recognized. While engaged in this exploration, preparatory to the denudation of the transverse processes in question, I noticed that the tumor apparently gave way, became partially collapsed, and was without any assistance bodily lifted out of its nest; at the same time a profuse gush of arterial blood flooded the wound, and no doubt a very alarming hemorrhage would have occurred had I not seized a handful of very small aseptic sponges, that had been held in readiness for the occasion, and immediately and tightly packed them in the bottom of the wound, in the intertransverse space and into the orifices of the canal from which the hemorrhage appeared to come. Over these small sterilized sponges a thick packing of iodoform gauze was applied, and the flap was held with two deep silver sutures over the packing, thus giving firm support to it. A careful sublimate dressing was applied externally and the whole firmly held in place by an elastic woven bandage wound over the forehead and neck. No further attempt was made to seek the artery, because the patient, who was already anæmic from previous losses, could ill afford to stand more hemorrhage. At any rate the sequel happily proved that further search was unnecessary, and that in this case, as in those of Lücke and Kocher, Stone, Warren and

Küster, King and Simes, careful plugging was all that was really necessary to permanently relieve the condition. About five hours after the patient had been brought to bed the elastic bandage was removed and a gauze roller bandage substituted. The patient continued to do well.

On July 26, five days after the operation, the dressings and tampon were removed. The wound looked perfectly clean; no pus visible. Only three of the six small sponges were removed; the remaining three were left as grafts in the intertransverse space, and were soon entirely amalgamated with the rapidly-growing granulations.

Eleven days after the wound was entirely healed, and on August 24, 1888, the patient was discharged entirely well.

About eleven months afterward the patient returned to the hospital with his wound entirely cicatrized and entirely free from any aneurismal lesion, but he stated that a few weeks after leaving the hospital (after the preceding operation) the scar, corresponding to the lower end of wound had "festered," and that a physician whom he had consulted had discovered the ball that had caused all the trouble and had extracted it. The ball had evidently grazed and possibly fractured one of the vertebral transverse processes and given rise to traumatic caries. At any rate the patient was now well and entirely rid of his aneurism.

The aneurismal sac, which was removed *in toto* at the time of the operation, presented the appearance of a spheroidal sac measuring 2½ inches in diameter. It was very firm in all its surface, except that portion which was evidently connected with the artery; here the walls were very thin. The sac walls consisted almost entirely of very compact and finely-laminated active clot; the interior was partially filled with soft, dark, grumous passive clot; a considerable mass of clot blocked that portion which has been attached to the artery. These clots were of very recent formation, and I do not doubt proved the efficacy of systematic compression. The sac had shriveled considerably, and surely did not represent when removed the full dimensions of its active period. The specimen was kept for a long time in the pathological museum of the hospital, but about a year ago, owing to some misunderstanding, was thrown away together with a lot of spoiled specimens.

In the fourteen fatal traumatic aneurisms the immediate cause of death may be summed up, as in the case of the nonaneurismal wounds of the vertebralis, viz: (1) hemorrhage; (2) shock; (3) sepsis; (4) exhaustion; (5) cerebral complications. The cases are worthy of individual mention:

(1) Chiari, 1829: The common carotid was litigated without effect; patient succumbed with cerebral and septic symptoms.

(2) Prof. Cattolica, of Naples, 1861: The commom carotid was ligated; six days after, the aneurism burst spontaneously, and the patient died of hemorrhage before assistance could reach him.

(3) Prof. Cattolica, also 1861: Exposed the course of the common carotid, but before closing the ligature tested the effect of temporary compression of the artery. As this did not arrest the pulsation of the tumor, the ligation of the artery was abandoned, and the incision was allowed to heal *per primam*. Two months after this attempt the patient succumbed to "gastric fever," with his aneurism pulsating (?) and unruptured.

(4) Prof. Nunziante, 1838: Cold; compression; aneurism ulcerates and patient dies of uncontrolled hæmorrhage.

(5) Gherini, 1861: Cold; compression; perchlorid of iron injections; ligation of common carotid by Monti; then plugging of wound. Thirty-six hours after ligation of common carotid patient succumbed to syncope from hemorrhage and exhaustion.

(6) Ramaglia, 1834: Common carotid was exposed and ligature applied but not tightened when it was discovered that its compression had no effect on aneurism. This patient died finally from uncontrolled hemorrhage.

(7) Kluyskens, 1848: Digital compression of common carotid totally arrested pulsation in tumor. The common carotid was, therefore, ligated, but after ligation the tumor continued to pulsate as vigorously as ever. Shortly after, the aneurism burst and the patient died of hemorrhage.

(8) A. Branco, 1862: Pulsation diminished markedly by compression of common carotid; this trunk was ligated, but ineffectually as regards tumor which grew much more rapidly. Patient died of exhaustion.

(9) A. Lücke, 1867: Carotid compression diminishes pulsation in tumor. This trunk was, therefore, ligated, but without benefit; on the contrary, marked aggravation. As the tumor threatened to rupture, injection of five drops of the iron perchlorid made into the sac in different places; slight sloughing of the skin took place and copious hemorrhage followed, and the method of Antyllus had to be appealed to. A free incision into the sac was followed by "a frightful gush of blood," which nearly carried the patient's life away, but was controlled by a styptic plug

insinuated between the occipital and atlas. The patient recovered from the immediate effect of the operation to die shortly after from cerebral complications, which were in a great measure attributable to injection and the ligation of the common carotid.

(10) Stroppa, 1866: A hematoma connected with the vertebral artery is incised; plugging arrests hemorrhage, but patient succumbs to repeated secondary bleedings.

(11) South, 1847: The common carotid is ligated under mistaken diagnosis; tumor rapidly enlarges and bursts into trachea.

(12) Simes, 1888: This is a most interesting case and most forcibly illustrates all the dangers and diagnostic difficulties that are liable to be thrown upon the surgeon while attempting to deal with the injuries which involve the vertebral. "Pressure upon the common carotid, while lessening the pulsation of the tumor did not, however, perfectly stop it. Before tying the ligature, which had been passed around the carotid artery, the operator continued his incision upward over the swelling and threw a ligature round the artery above it. The ligature below was now tied, and instantly the most terrific flow of blood gushed out of the wound. The upper ligature was immediately tied, but had no control over the hemorrhages; artery forceps and fingers were employed to seize any and all the bleeding points, but the blood continued to flow until finally Dr. Nancrede thrust his finger deep into the wound against the vertebra, when the hemorrhage at once stopped. Attempts to plug the vertebral foramen with a cork plug failed, but the hemorrhage was finally controlled by packing the canal with a long strip of lint reinforced by systematic packing of the wound. While the patient was improving from the immediate effects of the operation, and when all danger from hemorrhage had ceased, cerebral symptoms developed and the patient died. In this case it is more than probable, as Dr. Nancrede stated in the discussion, that several vessels were involved in this injury; the distal end of the internal jugular and carotid were bleeding at the same time as the carotid. He did not think that the vertebral alone could have poured out this large stream of blood.

In addition to these cases there are three more that must be accounted for to complete the list:

(*a*) The case of F. Verardini, in which cold, rest, and compression were systematically applied without much benefit, the patient escaping the observation of the surgeon and probably dying from spontaneous hemorrhage.

(*b*) The case of Stubbs, of Liverpool, in which a very rare case of idiopathic cervical vertebral aneurism was mistaken for a carotid aneurism and this artery ligated without benefit, the patient succumbing to hemorrhage.

(*c*) The case of Sydow, also idiopathic, of which I only know that it resulted fatally, though not from what cause.

Other observations in which injuries involving the vertebral artery are recorded may be found scattered here and there in the general literature, but they are mere passing references which can not be quoted with any advantage to the reader, as they are too meager in details for classification or instructive inference. Indeed, several, even many, of the cases that are included in my tables have been very insufficiently described, and I have found it often difficult to secure sufficient data for simple tabulation.

CONCLUSIONS.

A. Treatment of traumatic aneurisms.—(1) There are certain favorable cases (Mœbus, Weir) of traumatic aneurism in the upper and more superficial portion of the artery, in which recovery is possible without operative interference. Rest, direct compression, and cold being apparently sufficient to arrest the circulation in tumor.

(2) That in every case, when the danger of rupture of the sac is not immediate, good results may be expected, if only as adjuvants to future radical treatment, from the systematic application of cold, local and general rest, combined with direct pressure on the sac or digital pressure over the artery below the carotid tubercle, using for direct compression ice bags containing shot, which are easily adapted to the contour of the affected region.

(3) That in the majority of cases the natural tendency of the aneurism is to progress rapidly to a fatal termination, in spite of the preceding measures, the sac usually rupturing in the direction of its weakest point, viz, the track of the wound that caused it.

(4) That this tendency to spontaneous rupture is markedly favored by the increased tension caused by the ligation of the carotid trunks, so frequently and unfortunately done under the impression of a mistaken diagnosis.

(5) That this deplorable result should always be avoided in case of doubt by a careful observation of the effects of temporary compression of the carotid upon the circulation of the tumor before applying the definitive ligature.

(6) That in almost all cases but one (Fenger's case), in which a deliberate and prepared attempt has been made to ligate the artery in the aneurismal region, or at the bleeding point, the efforts of the operator have been frustrated by the copiousness of the hemorrhage, and temporary plugging of the bleeding spot, and, at times, the more accurate plugging of the arterio-vertebral canal have been forced upon the surgeon as methods of necessity instead of the method of election.

(7) That fortunately this method of plugging, when combined with the free exposure of the bleeding region and clearing out of the clots, has thus far given the most encouraging results, and that the more aseptic and nonirritating the material used in plugging the greater the simplicity of the after-career of the case, and, judging by the especially fortunate or excellent results which were obtained by Warren Stone, 1847, with plain charpie lint; J. Mason Warren, of Boston, with sponges; by King, of Hull, with oiled lint; by Küster, with iodoform gauze; by Sime, with plain lint; and my own experience with well sterilized sponges, reinforced by iodoform gauze, it would be unnecessary to resort to styptic plugs (as in Lücke's or Kocher's cases), which have a tendency to inflame a wound and render its aseptic management most difficult. In addition, as in the writer's case, small fragments of sterilized sponge, if they are used only in plugging the canals, have the advantage that they may be allowed to remain permanently in the wound, where they are incorporated as grafts by the living tissues.

(8) That the use of coagulant injections is especially to be condemned; the perchlorid of iron (as in Lücke's case) having proved most pernicious. Ergotin (Langenbeck) injected into the periphery of the sac may aid in effecting a cure, but it is exceedingly doubtful if this material will distinguish itself more favorably in this region than in the treatment of other aneurisms; while the newly isolated physiological fibrin ferments (Wright) may prove less irritating, they will be likewise open to objection from the mechanical standpoint (embolism). Possibly, electrolysis and Macewen's aseptic method of securing the formation of white thrombi by "needling" may claim some success in the future, but this is very doubtful, and the most authorized opinion would point, at present, to

(9) The acceptance of the method of Antyllus, modified by the conditions of modern surgery, as the only reliable, if still dangerous, method of dealing with this always formidable condition, at least, in the majority of the cases. If this operation is decided upon, every preparation should be made to meet all emergencies. Saline infusion may be required, but a good supply of sterilized sponges, iodoform gauze, and long-handled, strong hemostatic (hysterectomy) forceps will be most useful, the latter especially in grasping bleeding points, or in applying strong pressure on the deep and unusually rigid tissues, in which they are found. The gouge, chisel, or "rongeur" forceps should not be forgotten; the rapid resection of a part of the transverse process may be required in order to permanently secure the artery; though, usually, the plugging of the arterio-vertebral canal alone will be quite sufficient to accomplish permanent hemostasis, and should always be attempted first, if only as a provisional measure, or in cases in which the exhausted condition of the patient will not permit more radical procedures.

(10) In the extremely rare cases of idiopathic cervical aneurism and in the circumscribed traumatic aneurisms that are situated high up in the posterior portion of the neck, and which would not be encroached upon by any of the classical incisions for the ligation of the vertebral artery its at origin, a ligation on the Hunterian principle might be attempted with some prospect of success, especially if cold and pressure and rest were resorted to as adjuvants in the treatment. While the collat-

eral flow from the circle of Willis is very rapidly reestablished, more so even in the vertebral circuit, than in that of the carotid, it is nevertheless possible that the contents of the sac may be completely coagulated before this collateral supply has been reëstablished.

(11) In aneurisms that are situated lower in the neck, the Hunterian ligation, if applied by any of the classical incisions for securing the vertebral at its origin, will almost certainly end in an Antyllian operation, for it will be impossible to reach the trunk of the artery without involving the sac in the incisions.

(12) When the aneurism is well circumscribed, is high up in the neck; when the ordinary local treatment has failed and the operator decides upon the method of Antyllus as a last resort, then it is justifiable to make an incision parallel with the anterior border of the sterno-mastoid, and following the lines mapped out by Fraeys and Chassaignac, reach the vertebral below the anterior tubercle of the sixth cervical transverse process and under the sheath of the carotid compress the vertebral before it enters the foramen, with the finger of an assistant. In that way the arterio-vertebral circulation will be temporarily arrested until the wounded artery has been definitely secured at the bottom of the aneurismal cavity. By this procedure, there will be much less traumatism inflicted on the weakened patient than if a formal ligation had been attempted. In addition, the danger of secondary cerebral complication will be lessened.

B. Treatment of the primary bleeding.—(1) In the management of bleeding wounds (non-aneurismal) of the vertebral artery, the principles of treatment are practically the same as in those which guide the surgeon in the open or Antyllian method of attacking the traumatic aneurisms of this artery.

(2) In some rare cases the nature of the injury is such that a direct attack on the bleeding point is practically impossible. This is notably true of those complicated gunshot injuries in which the missile has penetrated through the mouth, and the blood is pouring into the pharynx or retro-pharyngeal space. In these cases there is usually an associated wound of one of the carotid branches, especially the internal carotid, and the hemorrhage is so violent that death takes place before any assistance can be rendered. The differential diagnosis can not be attempted under these circumstances, and as plugging through the mouth is impracticable, the only hope for the patient lies in the immediate but provisional control of both the common carotid and the vertebral artery of the corresponding side, with a view of cutting off the entire arterial supply from the injured region. This result can be obtained without much difficulty by rapidly exposing the carotid sheath at the point of election and passing a ligature around the artery, which is not to be closed, however, but should be transferred to an assistant who can control the circulation of the artery by simply pulling on the loop; the operator then presses with his finger in the depth of the wound at a point just below the anterior tubercle of the sixth cervicle vertebra and in this way arrest the flow from the vertebral artery. A complete control of the two vessels is thereby obtained; the hemorrhage is arrested and the differential diagnosis can be undertaken with more deliberation. The definite ligature may then be applied to either one of the exposed arteries, or to both if necessary.

(3) In cases complicated with an injury of the internal jugular, high in the neck and communicating with the pharynx, the resources of surgery are reduced to a minimum. But the traumatism is so great that the shock of the injury alone will often kill the patient almost instantaneously, and if this is not the case the bleeding will be so profuse that life will ebb out long before any efficient assistance can be rendered.

(4) In the more common cases the difficulties and dangers are greatest in the lower cervical course of the artery before its entrance into the foramen of the sixth cervical vertebra, owing to the immediate proximity of vital structures, especially on the left side. Wounds of this portion are generally fatal before the surgeon is called upon to deal with them, owing to the rapidly lethal effects of associated

hemorrhage from the carotid and subclavian arteries and corresponding veins. In wounds of this and the remainder of the cervical portion of the vertebral artery the fundamental maxim in the treatment of hemorrhage, viz, "to control the artery while bleeding and at the bleeding point," imposes itself as a first duty. This control can only be effected by the methods previously indicated when dealing with traumatic aneurism, and may be finally summarized in a general way as follows:

(*a*) If allowed by the position of the wound, deep and strong pressure should be made, by an assistant, below the carotid tubercle with a view of compressing the vertebral at this point.

(*b*) The wound should be freely enlarged in order to more directly expose the artery.

(*c*) Direct pressure with the finger in the wound should be applied to the bleeding point.

(*d*) Pressure on the bleeding point with strong hemostatic (hysterectomy) forceps holding a small sterilized sponge, or by actually clamping the bleeding point en masse, as a substitute for the finger, and allowing the hemostat to remain in situ for several days, if ligature is impracticable.

(*e*) Denudation or exposure of the artery in the intertransverse space, or, if necessary, by biting with "rongeur" or gouging out the antero-external portion of the bony canal in which the artery is contained. This last procedure is perfectly practicable in any part of the vertebral canal, provided a free exposure of the transverse process is obtained and the bleeding be provisionally controlled by digital or forci-pressure.

(*f*) Careful attention to antiseptic, systematic packing with iodoform gauze being the best protection against infection, which, in this class of injuries, is especially liable to fatal consequences long after hemostasis has been secured.

TABLE I.—*Intra-cranial aneurisms of the vertebral artery.*

No.	Situation of aneurism.	Age.	Sex.	Cause of injury.	Operative and other measures of treatment.	Name of operator or reporter.	Date and title of publication in which found.	Result.	Remarks.
1	Intracranial	24	Male	Idiopathic	None	Henry J. Gore, 1826.	Journal Morbid Anatomy, London, 1828, p. 22.	Died	Discovered at autopsy.
2	do				do	1849	Am. Journal Med. Sciences, Phila., 1849, No. 3, XVIII, 122.	do	No history; specimen presented to Dr. J. Neili, University of Pennsylvania.
3	do	61	Female	do	do	Sydow	Torh. Svens. Lak. Sällsk. Sammank, Stockholm, 1865, 1866, 191.	do	
4	do	67	Male	do	do	M. E. Echeverria.	Med. Rec., N. Y., 1869, 1870, IV, 1.	do	Discovered at autopsy.
5	do	19	do	do	do	Lorne	Bull. Soc. Anat. de Paris, 1869, 20, XIV, 455.	do	
6	do	45	do	do	do	Sevestre	Bull. Soc. Anat. de Paris (1872), 1874, 2 s, XVII, 415.	do	Cerebral tumor; syphilitic.
7	do	49	do	do		V. G. Fontarbe	Un cas d'hemiplegie alterné par Aneurysme de la vertebral, 4th Paris, 1874, Paris, Thèse.	do	Discovered at autopsy.
8	do	56	do	Traumatic		F. Schultze	Arch. f. path. Anat., Berl., 1875, LXV, 585.	do	
9	do	63	Female	Idiopathic		E. Leclaire	Presse Med. Belge, 1876, XXVIII, 153.	do	Discovered at autopsy.
10	Intracranial, double.	25	Male	do			Guy's Hospital Reports (1890).	do	Cerebral hemorrhage; discoved at autopsy.
11	do	30	do		Potass. iodid	Anderton	Trans. N. Y. Path. Soc., 1880, IV, 180.	do	

TABLE II.—*Traumatic aneurisms of the vertebral artery.*

No.	Situation.	Age.	Sex.	Cause of injury.	Operative and other measures of treatment.	Name of operator or reporter.	Date and title of publication in which found.	Result.	Remarks—Errors in diagnosis, if any.
1	Cervical	23	Male	Punctured wound.	Cold applications	Mœbus, 1827	J. d. Chirurg. und Augenheilk. Berlin, 1830, XIV, 98.	Recovered.	The common carotid was compressed, but no ligature tied because it was observed that pulsation of aneurism was not arrested thereby.
2	Cervical, first and second vertebræ.	28	do	do	Ligature of common carotid.	Chiari, 1829	Chassaignac: Traite clin. et pract. d'oper chir., 1861, I, 334. Translated from Il Filiatre Sebezio, Ann. 3, fasc. 2, and also reported as Caroselli's case by Barbieri.	Died	
3	Between second and third vertebræ.	20	do	do	The carotid artery was exposed and a ligature placed around it, but not tightened.	Ramaglia, 1834	Arch. genl. de Med. Paris, 1834, 25, V, 138–140. Translated from Il Filiatre Sebezio, 1834.	do	
4	Behind angle of inferior maxilla.		do	do	Ligature of common carotid.	Cattolica, 1836	Gaz. Med. de Paris, 1836, 2 s, IV, 425. Translated from Il Severino.	do	
5	Behind angle of inferior maxilla.		do	do	Compression and styptic application.	do	Same reference	do	
6	Below and behind apex of mastoid.	30	do	Stab	Cold; compression of common carotid, and plugging ulcerating opening. Prof. Respoli suggested ligature of the vertebral in the intertransverse space, en masse, but not done.	Prof. Nunziante Yppolito, 1838.	Monograph "Ligatura dell'Arteria vert. nei casi di Aneurismi della stessa." 16 pp. 1838. Quot. by Gherini (A.), in his memoire, Ferite del 'Arteria Vertebrale, Milan, 1867.	do	Diagnosis suspected in course of operation only.
7	Between fourth and fifth vertebræ.	40	do	Idiopathic	Ligature of carotid	H. Stubbs, 1846	Liverpool Med. Chirurg. Journal, 1857, I, 110–112.	do	Supposed at first to be an aneurism of internal carotid.
8	Upper cervical region.		do	Wound?	Ligature of common carotid.	South, 1847	Chelius' Surgery, Vol. I, p. 1067, 6th Ed., quoted by T. Holmes and Barbieri, *vide infra*.	do	Fifteen days after ligation of carotid the aneurism burst into the trachea. Diagnosis made post-mortem.
9	One inch below mastoid.	23	do	Punctured	do	Kluyskens, 1848	Ann. Soc. de Men. de Gand., 1848, XXI, 211,	do	
10	Back of neck	30	do	Stab	Incision; plugging in intertransverse process.	Stone, 1849	New Orleans Med. and Surgl. Journal, 1849, 1850, VI, 555.	Recovered.	This was a nonpulsating tumor, and was supposed to be an abscess, and incised.

11	Between second and third vertebræ.	29	...do	Punctured wound.	Ligature of carotid.....	A. Branco, 1862 .	Gaz. Med. de Lisbon, 1862, x, 597.	Died...	It was first diagnosticated an abscess, and afterwards an aneurism of the carotid or one of its branches.
12	Between atlas and occiput.	23	...do	Punctured wound.	Ligature of carotid; aneurism injected with perchloride of iron.	A. Lücke, 1867 ..	Arch. f. klinische Chirurg., Berl., 1867, VIII, 78.	Died ...	
13	Between fourth and fifth cervical vertebræ.	.....	...do	Gunshot.....	Incision; plugging; patient succumbed to repeated bleeding.	Stroppa, 1867....	A. Barbieri: Monograf., dell' Arteria Vertebrale, Milano, 1867–'68, Gazz. Med. Lombard., 1867–'68.	...do ...	This was originally an abscess which ulcerated the vertebral artery.
14	Below atlas and axis.	20	Female .	Stab	Cold; compression; ligature of common carotid by Monti.	Gherini	Gherini: "Ferite dell' Arteria Vertebrale," Milano, 1867 (Memoir).	...do ...	On post-mortem examination the artery was found to be anomalous; entered the foramen of fifth cervical vertebra, which accounted for temporary arrest of bleeding by compression over common carotid.
15	Between fifth and sixth vertebræ.	42	Male....	Punctured wound.	Incision and plugging of artery in transverse canal.	Kocher, 1871	Schmidt's Jahrbücher, Leipzig, 1872, CLV , 191. From Arch. f. klin. Chirurg., Berlin, 1871, XII, 867.	Recovered.	
16	Behind and below mastoid process.	33	Female .	....do	Cold; pressure; electropuncture.	Verardini, 1872..	Bull. Soc. Anat. d. Bologna, 1872, 58, XVII, 415.	Died ...	Patient disappeared, and could not ascertain result, but he was not improved when he deserted.
17	Two inches below, and 1-inch post., to lobe of right ear.	28	Male....	....do	Digital pressure and compression.	R. F. Weir, 1884.	Archives Medicine, New York, 1884, XI, 157, 1162.	Recovered.	
18	Between atlas and axis.	19	...do	Gunshot	Ligature of left common carotid; incision of sac, and ligation of vertebral artery.	C. Fenger, 1881..	Med. Standard, Chicago, 1887, I, 336, 35, 1887.	...do ...	Intra-venous transfusion was required to revive patient.
19	Fifth cervical vertebra.	41	Female .	....do	Ligation of common carotid, and plugging of vertebral in canal.	G. Henry Simes, 1888.	Proceedings Phila. Acad. of Surgery, June 4, 1888; Med. News, vol. LVIII, 1888, p. 78.	Died ...	Other vessels were involved in the injury.
20	First and second cervical vertebræ.	21	Male....	....do	Incision of sac, and plugging vertebral in canal.	R. Matas, 1888 ..	Annals of Surgery, Nov., 1893, p. 477.	Recovered.	

TABLE III.—*Wounds and other (non-aneurismal) injuries of the vertebral artery.*

No.	Situation.	Age.	Sex.	Cause of injury; weapon.	Operative and other measures of hæmostasis and treatment.	Name of operator or reporter.	Date and title of publication in which found.	Result.	Remarks, errors of diagnosis, if any, etc.
1	Between occiput and atlas.	Adt.	Male....	Stab	None	Fabricius, 1750..	Fabricius, Philip, Conradus of Buzbach, in *Præcipuæ in cautiones in sectionibus et perquisitionibus cadaverum humanum observandæ*. Bruckmann, 1750. A. Barbieri. Monograf. dell'Arteria Vertebrale, Milano, 1867, VI.	Died...	
2	Extreme upper portion; R.	.do .	...do	Gunshot.....	.....	L.J.Sanson, 1830	Des Hémorrhagies Traumatiques, Paris, J.B. Baillière, 183.	...do ...	First bleeding stopped spontaneously; then secondary hemorrhage set in on tenth day, which caused death before carotid could be ligated. True nature of injury only discovered after death.
3	Second cervical vertebra; R.	31	...do	Stab	Ligation of common carotid by mistaken diagnosis; plugging of wound.	N. Vosin, 1841...	Opérations Chirurgicales; Gaz. Méd., Paris, p.138, 2ᵉs., vol. IX	...do ...	Death from secondary hemorrhage; exhaustion. True nature of injury only discovered after death.
4	Second and third cervical transverse processes.	58	...do	Gunshot.....	.....	Jolly, 1841.....	Gaz. Méd., Paris, 1841, 2ᵉs., IX, p. 138.	...do ...	Death was instantaneous, and source of hemorrhage only discovered after death.
5	Upper cervical....	Adt.	...do	Stab	Ligation of common carotid.	Thurat, 1848	L'Ossieur: Annal. Soc. Méd. d'Emulation de la Flandre occidentale, Roulers, 1848, II, 306	...do ...	Source of hemorrhage only discovered after death.
6	First cervical vertebra.	.do .	...do	Gunshot.....	.....	Stromeyer, 1850 .	A. Barbieri: Monograf. dell' Arteria Vertebrale, *loc. cit.*, et Pirogoff, Kriegs-Chirurgie, 1864, p. 563.	...do ...	Death instantaneous; other injuries.
7	Sixth cervical vertebra; L.	.do .	Female .	....do	Ligation of inferior thyroid and vertebral arteries in the wound.	Maisonneuve and Favrot, 1852.	Journal des Connaissances médico-chirurgicales, Paris, 1852, 2ᵉs., vol. II, p. 181.	...do ...	Death caused by purulent infiltration of neck and sepsis.
8	Below sixth cervical vertebra transverse process; L.	.do .	... do	Stab	Ligation of common carotid artery, internal jugular vein, and attempted ligation of left sub-clavian artery.	J. Watson, 1853 .	J. R. Wood: N. Y. Med. Journal, 1875, n. s., III, 40.	...do ...	Cerebral complications and sepsis.

9	Between third and fourth cervical tranverse processes.	25	Male....	....do	.....	J. H. Carter, 1854.	Trans. M. and Physical Society of Bombay, 1853, 4, 1855, n. s., II, 313.	...do ...	Died almost instantaneously; no time for surgical assistance; other injuries.
10	Fifth cervical vertebra; R.	18	...do	Gunshot.....	Plugging; or pressure, superficially applied.	W. H. Van Buren, 1857.	N. Y. Journal Medicine, vol. II, 3 s., 1857.	...do ...	Other injuries; the hemorrhage was secondary to ulceration of vertebral from retro-pharyngeal suppuration, etc.
11	Second and third cervical vertebræ.	11	...do	....do	Systematic plugging of wound with small bits of sponge dipped in styptic solution.	J. Mason Warren, 1861.	Surgical Observations with Cases, Boston, 1867, p. 553; also, Boston Med. and Surg. Journal, 1862, LXVI, p. 389.	Recovered.	
12	Fourth cervical transverse process.	Adt.	...do	Ulceration of artery from tubercular spinal caries.	Plugging of bleeding abscess cavity.	Perrin, 1861-'62..	Bulletin Société de Chirurgie de Paris, 1861-62, 2 s, p. 97.	Died...	This injury of the vertebral is entirely due to pathological causes.
13	Fourth cervical ..	do	...do	Gunshot.....	Plugging	Kade, 1862	Gazz. Med. de St. Petersburg, Vol. II, 1862; Archiv. f. klin. Chirurg., Vol. v; P. Laudi, Lezioni di Chirurgia Operatoria, Bologna, 1867, p. 231; quoted also by Barbieri, *loc. cit.*	...do ...	Other complicating injuries of mouth and pharynx; source of hemorrhage ascertained only after death.
14	Between occiput and atlas.	30	...do	Stab	Plugging; ligation of common carotid by mistake.	Prichard, 1863...	Augustus Prichard: Proceedings Bristol Branch British Med. Assn., British Medl. Journal, 1863, I, 399.	...do ...	True source of hemorrhage only discovered at autopsy.
15	Before entering the sixth transverse process.	Adt.	...do	Gored by ox....	.....	Pirogoff, 1864 ...	Pirogoff. Krieg Chirurgie, 1864, p. 563.	...do ...	Other complicating injuries; exact nature of injury only ascertained after death.
16	First cervical vertebra.	27	...do	Gunshot.....	Pressure over carotid.....	D. C. Peters, 1865.	D. C. Peters: Am. Journal Medl. Sciences, 1865, N. S., XLIX, 373.	...do ...	The internal carotid, as well as vertebral, was injured; other complications added to the gravity of the injury.
17	Between first and second cervical vertebra.	20	Female .	Stab	Ligation of common carotid by mistake.	Monti, Barbieri, 1861.	A. Barbieri: Monografia dell' Arteria Vertebrale, Milano, 1867; and Gazz. Med. Ital.-Lombard, Milan, 1867, Vol. II.	...do ...	The autopsy alone revealed the true source of the hemorrhage.
18	Between third and fourth cervical vertebra.	30	Male....	.... do.....	.....	Saviotti, 1867 ...	Gherini, jr.: "Ferite dell' Arteria Vertebrale," 1867, pamphlet, Tip di Marini, via Durini, No. 31 (12mo., pp. 43)	...do ...	Death took place shortly after the injury before assistance could reach patient. Source of bleeding only discovered by autopsy.

TABLE III.—*Wounds and other (non-aneurismal) injuries of the vertebral artery*—Continued.

No.	Situation.	Age.	Sex.	Cause of injury; weapon.	Operative and other measures of hæmostasis and treatment.	Name of operator or reporter.	Date and title of publication in which found.	Result.	Remarks, errors of diagnosis, if any, etc.
19	Between fourth and fifth cervical vertebræ.	Adt.	Male....	Stab.....	.....	Caspar-Liman, 1871.	Caspar-Liman: Prakt. Hankbuch der gerichtlichen Medizin, 5 aufl., Berlin, 1871.	Died...	This case is of interest simply because no profuse hemorrhage appears to have followed the injury; other causes carried off the patient five days after the injury.
20	Second cervical vertebra.	11	...do....	Ulceration of artery from tubercular disease.	.....	Neuretter, 1873 .	Oestr., Jahrb. für padiat., 1873.	...do ...	In this case the vertebral was eroded by osseous tubercular disease.
21	Upper cervical region.	25	...do....	Stab.....	Systematic plugging and pressure.	King, 1885	The Lancet, November 28, 1885.	Recovered.	One of the transverse processes was felt to be fractured.
22	Second cervical...	35	Female .	Pathological (tubercular abscess of neck involving second transverse cervical process).	Systematic plugging with iodoform gauze after opening abscess.	Küster, 1883	Berliner klinische Wochenschrift, No. 48, November 26, 1883.	Died...	Hemorrhage from vertebral was perfectly controlled, but patient died nineteen days after opening abscess from some cerebral cause and other complications.

THE USES AND ABUSES OF THE DRAINAGE TUBE. IN WHAT CLASS OF WOUNDS IS DRAINAGE ADVISABLE?

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The object of this paper is to ascertain if we even now possess the requisite data from which we may draw deductions and formulate rules for guidance in the employment of drainage in wounds. My limits, however, prevent the proper consideration of any closely co-related subjects which are fundamental to the discussion.

It has always been a subject of comment, and is even yet one of surprise, to note the possibility of the extent of injuries undergoing rapid and easy repair, where the protecting external surfaces have remained unbroken. Extensive bruises, laceration of the tissues, large effusions of blood into the soft parts, etc., all are cared for with little disturbance when uncontaminated by extraneous substances. Note, however, the difference when the more or less devitalized material becomes the site of bacterial infection.

It is accepted without discussion that such injured or dead material, serous or bloody effusions, have become in a large degree foreign to the organization which would be benefited by their removal, if safely effected. It seems perfectly rational that such removal should be undertaken, and when such material is or has become fluid that the drainage-tube would be very conducive to this purpose. It was undoubtedly a contribution to surgery of very great value, when in 1859 Chassignac formulated the conditions which were judged demandatory for drainage. Then, as a rule, all wounds were septic, and the less the retention therein of the decomposing fluids the better. However, all bleeding vessels were generally ligatured with silk and one or both ends left long enough to protrude from the wound.

The conservatism of one's nature is such as to hold with a retentive grasp the teachings which have generally been accepted as demonstrated to us by our former masters. This is well exhibited in our present subject. Even Mr. Lister, who has lived to see the full fruitage of his revolutionary doctrines, based upon the knowledge of bacterial infection, fails to appreciate the lessening need for the escape of the fluids from aseptic wounds, and emphasizes with painstaking care the requisites of thorough drainage. Such measures, however, demand the most rigorous care and attention with multiple, clumsy, and expensive dressings; and the wound, necessarily open, even when thus protected, is recognized as a source of danger.

Under such leadership, is it to be wondered at that the general practice still is to drain all wounds of any considerable extent, without making clear distinction why or demonstrating the benefits to be derived therefrom? I quote from a recent authority:* "But when the wound secretions are allowed to flow off as rapidly as they form, a most important if not the most important aid to repair is thus secured. Hence arises the surgical law, now almost universally adopted, that all wounds of any magnitude must be provided with drainage from the outset."

We will return to the subject of tension and distension of wounds later in the discussion, and take up for the present the conditions pertaining to wounds where the necessity for drainage is generally accepted, to wit, a suppurating wound not easily or safely susceptible of disinfection. Here we have necrotic tissue and albuminoid secretions, kept at a nearly uniform temperature favorable for bacterial development. Food, fluid, heat, soil most fitting for the growth of the already germinating seed. On the other hand, a good individualistic, vital, resistant power will have summoned aid to the extent of its resources to limit the evil it may not destroy, and the assistance here rendered by the surgeon is often of the highest value. Disinfection of such a wound is rarely primary, and drainage is of much importance to aid in the elimi-

* Handbook of Medical Sciences.

nation of the foreign material. With our present knowledge of the best methods for the treatment of such wounds, drainage is to be considered essential.

Notwithstanding the above premises seem sufficiently definite in order to determine when drainage should be used, we are met with a diversity and confusion of ideas and opinions, when we take into consideration the general class of aseptic wounds. That no clear, fundamental basis of conditions has been formulated is the more surprising, since the logical deductions, based upon the noninfected state of wounds made in the healthy structures of a well-vitalized individual would be to restore the parts so that complete primary union could ensue, and to protect the same from a possible secondary infection. I need not refer to the general prevailing practice of drainage in wounds in all our large hospitals upon both continents, and shall only quote briefly from very recent writers who have specially discussed the subject. In the routine treatment of laparotomy for pelvic lesions, without special considerations of septic conditions, Dr. McMurtry, of Louisville, writes:

The object of drainage is to dry as quickly as possible all the peritoneum around the bottom of the tube. * * * When peritoneal drainage is conducted in this way it is thoroughly efficient, and I have never known septic infection to occur thereby.*

Dr. Price, of Philadelphia, expresses his views as follows, upon the operative methods for the removal of uterine myomata:†

As to the importance of drainage, I would simply have to give up my work, if it were not for abundant drainage. I value it above all other methods of saving life. It is true, however, I have had very few cases of simple operations. I operate constantly for advanced disease, yet my mortality falls below 5 per cent, and I attribute it largely to my uniform practice of drainage.

Dr. Mundè, of New York,‡ in discussing the prevention of fistula after cœliotomy, states:

The use of a drainage-tube, in my opinion, decidedly favors the formation of an abdominal fistula, since it causes the production of a canal surrounded by adhesions and leading upward through the abdominal wound, and by its mere pressure provokes sero-purulent fluid. The cutting through of silk or of other imperishable sutures likewise tends to promote deep irritation and suppuration in the pelvis and the reopening sooner or later of the wound. A probe may pass down 5 or 6 inches and the exploring forceps may find and withdraw the offending suture, whereupon the sinus gradually closes. * * * In the prevention of fistula after cœliotomy one is to use all the well-known antiseptic precautions, remove all diseased and infected tissue, employ only absorbable animal sutures, close the wound completely, and there will be no fistula. * * * Nonabsorbable sutures, such as those of silk often prove to be, keep up a focus of irritation at the bottom of the wound, which at best excites suppuration and the burrowing of the pus towards the most available opening, usually the abdominal incision; and until the cause of the irritation, the suture, is removed the discharging sinus exists.

Let it be granted from the brief review of the foregoing premises that the object of drainage is to remove safely deleterious substances from a wound, which, if allowed to remain, will in a greater or less degree retard cure, or even endanger life. The infected materials not only become dangerous in themselves, but they generate a chemical poison, which in amount is often sufficient to cause death.

To what degree the living tissues are endowed with resistant power for self-protection can perhaps never be determined with accuracy. It is, however, settled beyond doubt that the healthy structures do have a resistant power to prevent to a certain extent the invasion of bacterial infection, and that this is in a more or less direct ratio to the physical vigor of the individual.

The phagocytic power of the cells to destroy bacteria under favorable conditions is also a most valuable aid in the preservation of life.

It is important that the surgeon devitalizes as little as possible the remaining tissues, that he approximates carefully clean surfaces in order to make the soil unfruitful to the accidentally implanted bacterial seed.

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*American Journal of Obstetrics, March, 1893.
†American Gynecological Society, May, 1893.
‡American Journal of Obstetrics, June, 1893.

Is the present state of operative procedures sufficiently accurate to warrant the assurance that complications arising from infection are not to supervene? This is the important question which must first be satisfactorily answered before we are in a position to determine at all positively when in wounds believed to be aseptic we are to use, if always, or not at all, drainage in the hope thereby to remove material possibly dangerous if allowed to remain.

It is certainly clear that the experience of the last twenty years has been leading toward the solution of this problem, until now it seems demonstrated beyond a doubt that an aseptic wound may be made in aseptic tissues and maintained aseptic until restoration is complete.

If this is true the *modus operandi* of modern wound treatment must be mastered, as the ritual service of a higher religion, before the surgeon is competent to enter upon the serious responsibility of his office. This portion of the subject would lead me too far from the theme under consideration, but fortunately we may accept that the members of this body require little instruction in this direction. If aseptic conditions are maintained then we may safely conclude that drainage of the wound will not be necessary, and if unnecessary certainly undesirable. At the best the drainage tube is a foreign body, and its presence in the wound prevents primary union of that portion of the tissues which are seperated by it. It keeps the wound to a certain extent an open one, and as such makes secondary infection so probable that the most careful antiseptic dressings are required to absorb and disinfect secretion and prevent atmospheric contamination.

In an aseptic wound, after the removal of the tube, the final closure of the tract is comparatively slow and by granulation. These are well-recognized objections, and efforts have been made to overcome these by many ingenious devices.

If drainage is to be discontinued in aseptic wounds it must be accepted that the greatest care is to be exercised in leaving as little devitalized tissue as possible. The wound should be clean and dry; the different layers of the tissues should be joined with as little injury as possible, and the external wound protected from infection. To secure the best results it is important to have clean incisions, devitalizing as little as possible the structures, minimizing irrigation, sponging, compression with artery forceps, injury from retractors, etc. The divided tissues must be rejoined by light-running, continuous, buried, tendon sutures. The skin is easily coaptated by a similar buried continuous suture, taken from side to side, parallel to the incision, through the deeper layer only. Then the wound is sealed with a germ-proof layer of iodoform collodion, reënforced by a few fibers of cotton. Such wounds go on rapidly to repair without edema of the tissues, pain, or even tenderness; the resulting cicatrix is minimized, which is of much importance in facial wounds, and often after some weeks is scarcely to be recognized.

Are all aseptic wounds in healthy organisms to be thus treated? Certainly, as experience abundantly demonstrates. The affirmative to such an important question, however, is undoubtedly to be maintained only by the most scrupulous of aseptic measures. When in doubt it may be better to drain large wounds, but I can not myself question that he who uses the drainage tube in aseptic wounds, unconsciously however it may be, thereby in a measure at least confesses his lack of confidence in his ability to maintain an aseptic condition. In the dealing with wounds the first consideration is over the safety of the patient. This is best conserved by a careful study of the individual and his surroundings, his possible external and internal foes. Locally the soil and the seed and the varying conditions of each must be kept in consideration. When in doubt of an infection in a wound, especially when its character is such that it will be likely to be attended with an abundant albuminoid secretion, drain; but let the surgeon ever remember that the highest theoretic condition is the restoration of the tissues to their normal relation as nearly as possible and retention at rest in an aseptic condition. This, in the great majority of wounds, renders drainage not only unnecessary, but when applied it is a positive detriment and a source of danger.

Complete closure of an aseptic wound by aseptic buried animal sutures, retained at rest by a germ-proof dressing, comes nearer to the ideal than any method yet devised. There is no fear of hemorrhage in an aseptic wound thus closed. There is no further danger from infection; expensive, clumsy, antiseptic dressings are entirely avoided, little subsequent care is requisite on the part of the surgeon or attendant, and the patient is relieved from the fear of suffering in the removal of stitches (stitch abscesses are impossible), is free from pain, and goes on to a rapid convalescence. I am assured that a better knowledge will restrict the use of the drainage tube almost entirely to septic wounds, and that operative wounds in aseptic tissues will be aseptically maintained without drainage.

AMPUTATIONS PROTHETICALLY CONSIDERED.

By GEORGE E. MARKS, A. M.

Intercourse with a considerable number of surgeons, those that live in the centers of prothetical industry, as well as those who reside in more remote parts, shows a lamentable absence of knowledge on the subject of "amputations viewed in the light of Prothesis." In consequence we artificial-limb makers have frequently brought to our presence stumps that are good, bad, and indifferent; stumps that could have been better; stumps that reflect credit, discredit, and no credit on the surgeons who performed the operations or attended to the stumps after amputations; stumps that can readily be inserted in artificial limbs with the assurance that the possessors will enjoy the sublime consolation of having realized the removal of their disabilities for all practical purposes; stumps that might have been better and would have been beyond criticism had operators taken advantage of opportunities which familiarity with the subject would have suggested; stumps that prevent the wearing of artificial limbs with that degree of comfort and efficiency that should accompany every case. The time has long been at hand when this subject should receive more thought and when prothetical knowledge should be more liberally disseminated.

I shall discuss the subjects from only a few standpoints.

(*1*) *Length of stump.*—No stump that is well covered with integumental tissue can be too long. I am well aware that when I advance this proposition I am antagonizing the views of artificial-limb makers who have not kept abreast of the times, and am controverting the rules that have been laid down by some writers on the subject. The progress that has been made in the development and construction of artificial limbs during the last decade or two has been noticeable. To-day artificial limbs are constructed that can be applied to stumps of any length, tibio-tarsal, medio-tarsal, and tarso-meta-tarsal amputations not excepted. Any stump that is capable of enduring pressure on the extremity is preferable to one that can not. In all partial foot amputations care should be exercised by the operator to prevent the contraction of the tendo Achillis. Tenotomy should be employed. The foot must be held in proper position, even if it necessitates fixation of the ankle joint. The advantages of a partial foot amputation, as well as a tibio-tarsal amputation, are many. For example: Artificial legs can be applied to stumps that result from such amputations that will restore the wearers to the amplitude of their usefulness. Artificial legs for such stumps do not cost more than half as much as artificial legs for stumps that do not extend as far down as the ankles. If the financial means of the possessor of any one of the above stumps will not permit him to procure an artificial leg he can get along tolerably well by walking on the remaining portion of the planter surface of his partially amputated foot, or by improvising an end-bearing socket himself.

(*2*) *Flaps.*—All stumps should, if possible, be provided with ample integumental flaps. I do not wish to be understood as advocating redundant flaps. If periosteal flaps can be secured it is always desirable to do so, as they provide more natural

cushions for the extremities and prevent integumental flaps from becoming adherent to the ends of the bone. If an amputation is to be made below the middle third of leg, bone can safely be sacrificed in order to secure integumental flaps, but if the amputation is to be made above the middle third of leg the sacrifice of healthy bone will not be warranted under any consideration. A stump extending below the knee, no matter how short, is preferable to a stump extending only to the knee, and a stump extending to the knee is preferable to a shorter stump. Stumps resulting from knee disarticulations are preferable for prothetical purposes, if the condyles and nodules of the femora are not removed. If the patella can be placed and secured in the intercondylic space it is desirable to do so. All amputations in the thigh should be made as distant from the body as possible.

(*3*) *Disposition of cicatrices.*—The rules established by Heys, Lisfranc, Choparts, Hancock, Pirogoff, and Symes should be rigorously observed in placing the cicatrices in all partial foot or ankle-joint amputations. The cicatrices of all amputations of the leg or thigh, forearm or arm, at any point between the articulations, should, if possible, be placed away from the extremities of the bones, whether anterior, posterior, exterior, or interior.

(*4*) *Treatment of stumps.*—I desire to call attention to the treatment of stumps. After stumps have become sound and healthy they tend to fatten or become edematous. This can, to a great degree, be obviated by the use of tight bandages.

(*5*) *Time to apply artificial limbs.*—It is safe to apply an artificial limb to a stump that results from traumatism as soon as the stump is healed and the possessor is able to get about on crutches. Nothing can be gained in such cases by waiting; in fact, waiting not only entails a loss of time, but offers an opportunity for the stump to become enervated from disuse. Stumps that have been caused by disease, especially if of a malignant nature, should be obliged to wait until there is a certainty that the vascular, cellular, and osseous contsruction will not suffer from confinement, compression, or exercise.

CURA RADICAL DE LAS HERNIAS.

Por el Dr. Luis C. Maglioni, Buenos Aires, Argentina.

Segunda serie: Diez casos operados con buen éxito.

En el número de junio de 1892 de los "Anales del Círculo Médico Argentino," publicaba mi primera serie de cuatro casos de cura radical de hernias, sin ningún fracaso operatorio. Hoy tengo la satisfacción de publicar las observaciones correspondientes á mi segunda serie de diez casos operados todos tambien con el mejor éxito, y entre los cuales figuran una hernia estrangulada y otro que es de trascendental importancia é interés clinico: el caso 12 á 14.

Debo attribuir estos buenos resultados, además de á un estudio minucioso y prolijo de los casos y al cuidado especial en las manipulaciones operatorias, al empleo de la mas estricta antisepsia, como acostumbro emplearla en todas mis operaciones.

Caso 5. Hernia ingüinal doble; enterocele; operación en el lado derecho; curación: N. N., italiano, alienado, de unos 35 años de edad próximamente. Imposible obtener del enfermo datos precisos respecto de la aparición de sus hernias.

La hernia derecha es mas voluminosa que la izquierda. Ambas reductibles, pero dificilmente coercibles por medio del braguero.

Vacilé algun tiempo sobre si practicaría la operación en dos veces ó si operaría ambas hernias en la misma sesión. Me dicidí por lo primero, convencido de que para hacer bien esta operación se necesita emplear generalmente bastante tiempo, quo éste se duplicaria, so pena de proceder rápidamente en actos quirúrgicos de suye minuciosos.

Resolví, pues, operar una sola de las hernias y elegí la derecha por ser la mas voluminosa, conforme hubiese podido elegir la izquierda.

El sábado 25 de junio de 1892, ayudado por los Dres. Quiroga (D. Atanasio), Gimenez y el practicante Sr. Gomez, procedí á la operación. Esta duró una hora y

media. Descubierto el saco, aislado é incindido, no encontré nada en su interior. Según el último precepto de Championnière, busqué, con el índice, en el interior del abdómen, el epiploon, con el fin de atraerlo al exterior y resecar una parte de él. En lugar de éste salieron unas ansas de intestino delgado, las que, lavadas y desinfectadas convenientemente, fueron nuevamente reducidas. Ligadura y resección del saco; sutura con crin de Florencia; tubo de drenaje.

Al dia siguiente, estado fisiológico y así los demás dias. Resolví no remover la curación hasta cumplidos los siete días.

El sábado 9 de julio descubrí por primera vez la herida. Excelente estado. Ni una gota de pus. Retiré todas las suturas y totalmente el tubo de drenaje. Nuevo vendaje suavemente compresivo.

El sábado 9 de julio levanté por segunda vez el vendaje. Cicatrización completa por primera intención.

A fines de agosto el operado está aún en cama, pues por ser alienado y por la imposibilidad de aplicar á estos individuos bragueros de precaución, temo especialmente en ellos la recidiva.

Pude observar en este caso un hecho señalado ya por Championnière, y es, en las hernias dobles, el referente al aumento de volúmen de una de ellas cuando la otra es operada. En mi enfermo, á pesar de no haber hecho visiblemente grandes esfuerzos y permaneciendo en cama, la hernia izquierda adquirió en menos de dos meses un volúmen mayor aún que el que tenía la derecha antes de ser operada y que era entonces mucho mayor que la izquierda. Se diría que las vísceras herniadas en el lado derecha aprovechaban la válvula de escape de la region inguinal izquierda, habituadas por otra parte á estar fuera del abdómen propiamente dicho, ó si se quiere, habituado el abdómen á contener en su gran cavidad una cierta cantidad de vísceras de menos.

Volveré mas adelante sobre este caso al ocuparme de la operación en el lado izquierdo.

Caso 6. Hernia ingüinal izquierda; enterocele; resección del saco; curación: Cárlos Pífferi, italiano, 57 años, cuerdo. Hace un año y medio que le apreció su hernia, segun dice él. Es ésta muy pequeña. Apenas desborda el anillo ingüinal externo.

Es reductible. Usa braguero, pero le molesta mucho.

Resuelta la operación, la practiqué el miércoles 13 de julio de 1892, asistido por el Dr. Zeballos y los practicantes Coé, Pizarro, Gomez, presenciándola el braguerista Mr. Le Balle.

La operación duró una hora.

Antes de operar á este enfermo supuse, por los dolores que acusaba en la región del anillo externo y por la falta aparente de una reducción completa, que se tratase de un epiplocele adherente. Abierto el saco no había nada en él. Introducido el dedo en el abdómen, no fué posible, en algunas lijeras tentativas, hallar el epiploon, ni lo consideré tan indispensable para insistir en ese propósito.

Nada de particular en éste caso. Ligadura y resección del saco. Sutura y drenaje.

A los ocho dias descubrí por primera vez el campo operatorio. Excelente estado. Retiré el tubo de drenaje y todos los hilos.

No volví á descubrirlo hasta el 27 de julio en que encontré una cicatrización completa por primera intención.

Estuvo en cama sin embargo hasta el 15 de agosto, como medio precaucional en contra de la recidiva.

Caso 7. Hernia ingüinal congenital; ectopia testicular; castración; resección de 100 gramos de epiploon; canalotomia; reseccion del saco herniario; curación: Emilio N., italiano, alienado, 39 años, excelente constitución. Presenta una hernia ingüinal derecha; no sabe decir desde cuando. La hernia es mediana en cuanto á volúmen y fácilmente reductible. En mi primer exámen no pude constatar la presencia del testículo derecho, pero momentos antes de la operación, estando la hernia reducida, era perceptible el testículo considerablemente atrofiado y muy inmediato al anillo ingüinal externo.

Diagnostiqué: hernia congenital, es decir, ausencia de túnica vaginal independiente del saco herniario, lo que confirmó la operación.

Practiqué esta el sábado 6 de agosto á las 10 a. m. ayudado por los Dres. Seco, Colon y Zeballos, los practicantes Coé, Gomez, Torres y Mr. Le Balle.

Abierto el saco me encontré con el pequeño testículo cuyo cordón estaba completamente retraido y adherente en la parte superior. Hubiera sido muy difícil si no imposible su desadhesión con el propósito de bajarlo y fijarlo en el escroto haciándole previamente un espacio. Creo que esta fijación, que no hubiese tenido sino un objeto moral tratándose de otro paciente, hubiese fracasado en este caso, por lo que, y de acuerdo con los colegas que me acompañaban, resolví extirpar este órgano verdaderamente inútil por su atrofía y la del cordón.

En un golpe de tos apareció en el campo operatorio una franja de epiploon. Toméla

y, extrayendo hácia afuera una buena porción de ese tejido, resequé unos 100 gramos en peso.

En seguida determiné hacer, por primera vez, la seccion del canal ingüinal según el procedimiento de Championnière. Sutura en U con cat-gut y algunas suturas mas en las paredes del canal.

El 7 y el 8 de agosto, el enfermo seguia sin la menor novedad.

El 12, sospechando la existencia de pus en la herida, descubríla y efectivamente fracasó la primera intencion, obtenida tan completa en los dos casos anteriores.

No obstante esta lijera supuración, el enfermo estaba completamente curado y en pié en los primeros dias de setiembre.

Caso 8. Hernia ingüinal doble; operación de la hernia derecha; canalotomia; resección del saco; curación: Vicente Luis, español, 39 años. Dice tener sus hernias de nacimiento. La izquierda es casi imperceptible, rudimentaria. Me ocuparé exclusivamente de la derecha.

Tiene además un hipospádias balánico. La hernia derecha es pequeña y reductible. No usa braguero. Reclama la operación animado por los muchos casos análogos que sabe han sido operados con éxito en el hospicio.

Siendo esta hernia de nacimiento, según el enfermo, pensé fuese vaginal, aunque por la independencia del testículo, creí pudiese haber alguna unión completa ó incompleta de la serosa peritoneal.

Procedí á operar á este individuo el sábado 27 de agosto de 1892, ayudado por los Dres. Sarmiento, Acuña y Zeballos y los practicantes Pizarro, Vatteone, Torres y Zabala.

Descubierto el saco, noté su independencia cavitaria de la vaginal, pero al mismo tiempo su íntima adherencia con esta túnica, sitio de fusión probable de la serosa peritoneal. Abierto el saco, salió un poco de líquido. No habia nada en su interior. Busqué y extraje del abdómen una cierta cantidad de epiploon que ligué y resequé.

El anillo era pequeño, como se observa generalmente en las hernias congenitales, y en tal virtud, habia pensado no hacer en este caso la canalotomia, pero era peligroso hacer pasar el pelotón de epiploon con sus ligaduras por un anillo tan pequeño. Temí el deslizamiento de una ó mas de dichas ligaduras, la hemorragia consiguiente, etc., por lo que incindí el canal inguinal, ó mejor dicho, su pared superior.

Practicadas las suturas coloqué dos pequeños tubos de drenaje, uno entre los elementos del cordón y la primera línea de suturas profundas y otro entre estas y la piel. Vendaje antiséptico y compresivo de la región operada.

Siguió el operado sin novedad. A los 8 dias, es decir, el 3 de setiembre, levanté por primera vez el apósito, y encontrando la cicatrización de primera intención, retiré todos los hilos y tubos. Practiquéle el segundo vendaje.

El 10 de setiembre levanté por segunda vez el apósito. Cicatrización completa.

Este enfermo, contra mi recomendación espresa, habia hecho algunos movimientos inconvenientes, levantándose de la cama para sus necesidades, etc.

El 12 se quejó de un dolorcito en la cicatriz. No le dí importancia.

El 13 seguia el dolor y aún algo aumentado.

El 14 dolor, inapetencia, pero falta de fiebre.

Examinando la zona operada noté á la vez que dolor, un poco de elevación hácia la pared abdominal. Se siente en ese sitio como un *plastrón* profundo. Diagnostiqué: flemón del tejido celular intra-parietal.

El 17 supuró dicho flemon y en 10 dias mas el enfermo estaba completamente bien y ha seguido así, sin recidiva ni inconveniente de ninguna clase, hasta el dia en que escribo esta historia.

Caso 9. Hernia ingüinal derecha estrangulada; canalotomia; resección del saco; curación: Luis Bernasconi, suizo, 60 años, domiciliado en la calle Venezuela 884. Tenía una hernia ingüinal derecha reductible y coercible por medio de un braguero desde la edad de 26 años. Era una hernia de tamaño mediano.

El 5 de setiembre de 1892, después de defecar, en momentos en que se levantaba para abotonarse el pantalón notó un dolor en la hernia y le fué imposible reducirla. Esto tenía lugar á las 2 p. m. A las 3 p. m. de ese dia el Dr. Giraud, médico de cabecera, me hizo llamar.

El enfermo se quejaba de fuertes dolores en la hernia, la cual estaba dura y muy sensible á la presión. No habia vómitos, el pulso era fuerte y regular pero no emitía gases.

Resolvimos verle de nuevo á las 5 p. m. después de hacer tomar al enfermo un baño caliente. El taxis era imposible y de todos modos inconveniente. Creo que, despues de la antisepcia y de los progresos que ha hecho la cura radical de las hernias, el taxis, en los casos de estrangulación, es un absurdo terapéutico y como tal está contraindicado.

Resolvimos, pues, con el Dr. Giraud operar á este enfermo sin pérdida de tiempo, difiriendo sin embargo hasta las 9 p. m., tomándome cuatro horas para la conveniente desinfección y preparación de los instrumentos, etc., tanto mas cuanto que la estrangulación era relativamente reciente.

A las 9 p. m. estábamos reunidos con el Dr. Giraud y el Dr. Valdez. El primero se encargó del cloroformo. La operación empezó á las 10 p. m.

Descubierto el saco se notó en la parte superior el relieve del intestino globuloso y por debajo un cuerpo rico en tejido adiposo, que en un principio nos pareció el epiploon.

Practiqué primeramente la canalotomía.

Hecha la incisión del saco, que era bastante delgado en su pared anterior, apareció el intestino fuertemente congestionado, muy alterada su coloración.

En la parte posterior del saco se notaba un tejido tan espeso que, no siendo epiploon ni intestino, pensé un momento si no seria la vejiga herniada, para lo cual exploré con la sonda uretral el receptáculo urinario, obteniendo un resultado negativo. Entonces el Dr. Valdez me sugirió la idea de que fuese el saco mismo espesado notablemente en esa parte.

Mientras resolviamos esa duda nos ocupamos del ansa intestinal herniada. Deshice las adherencias en el cuello del saco, saqué hácia fuera una porción mas de intestino, hice una prolija desinfección y reduje fácilmente.

En seguida, hallando razonable la observación del Dr. Valdez independicé este espesísimo saco que por añadidura estaba aun doblado, en la pared posterior, de una espesa capa de tejido grasoso.

Practiqué, bien alto, la ligadura del cuello con tres hilos de cat-gut en cadena, seccioné y reduje. Sutura del canal, sutura estratificada, drenaje, sutura final con crin de Florencia, curacion, vendaje, etc.

La operacion terminó á las 11 y 25.

Vuelto en si del cloroformo el enfermo, manifestó encontrarse muy aliviado.

Para abreviar esta historia, diré someramente que en este caso no pude obtener la cicatriz de primera intencion, que el trayecto de la herida supuró un poco, formándose un flemón en el tejido celular intermuscular, como en el caso anterior, lo que produjo por algunos dias algun malestar en el enfermo, fiebre, etc., y alarma en la familia. Todas estas complicaciones fueron no obstante dominadas por medio de un tratamiento médico-quirúrgico apropiado, hasta que el enfermo completamente curado se levantó de la cama en los primeros dias del mes de noviembre.

Al escribir esta historia, el Sr. Bernasconi está perfectamente bien. Librado de la estrangulación y de la hernia por la intervención quirúrgica, anda sano y ágil como nunca, usando por mi consejo el braguero de precaución para evitar la recidiva.

Para concluir permítanseme algunas reflexiones :

La hernia del Sr. Bernasconi era una hernia en gran parte *grasosa*, es decir, que la grasa que aumentaba tanto el espesor de la pared posterior del saco era grasa subperitoneal herniada conjuntamente con la serosa. Esto exponía á un error anteoperatorio, pudiendo creerce que la hernia propiamente dicha fuese mayor de lo que en realidad era, siendo así que el continente en este caso abultaba tanto ó mas que el contenido.

Recordando aquí, lo que dije al principio de esta historia, que se trataba de una hernia de tamaño mediano, se deduce, pues, lo que realmente comprobó la operación, á saber; que se trataba de una hernia incompleta, que no alcanzaba á haber ni siquiera una ansa intestinal herniada; hernia intestinal sin mesenterio visible. Esto, unido á la ausencia de epiploon en el saco, agrava considerablemente estos casos de estrangulación y explica porqué á las *ocho horas* del accidente el intestino de este enfermo presentaba una coloración y un aspecto temible que hubiesen puesto en muy grave compromiso su vida si se hubiese demorado en operarle.

Por esto creo que, en casos análogos y por mucha importancia que dé, como el que mas, á la prolija antisepcia preoperatoria, tiene tal vez mas importancia el decidirse, como Dios lo ayude al cirujano, á operar pronto estos casos en que por momentos, por minutos, cambia seriamente la escena.

Caso 10. Hernia ingüinal doble; operacion en el lado izquierdo; enterocele; canalotomía; resección del saco; curación: Ignacio Tócoli, italiano, 45 años. Tiene hernia ingüinal doble. La izquierda, que es la mayor, es de tamaño mediano. Hace 22 años que la tiene. Es reductible y coercible, pero le molesta mucho.

Conocedor de mi serie feliz, reclama ser operado, animado tambien por su médico el Dr. Sarmiento.

El sábado 17 de setiembre efectué la operación ayudado por los Dres. Sarmiento, Mujica, Acuña, Seco, Moranchel y los practicantes Vatteone, Gomez y Zabala.

Tardó mucho tiempo en cloroformarse este enfermo.

La operación empezó á las 10 y 5 y terminó á las 11 y 20. Descubrí el saco y, después de aislado bien, procedí á la canalotomía, según el procedimiento de Championnière. Después, haciendo una lijera tracción, liguć el cuello con dos hilos de cat-gut encadenados y seccioné debajo. Suturé en U el canal ingüinal; suturas perdidas y flojas con cat-gut; tubo de drenaje, etc. Antisepcia y vendaje compresivo.

Sucedió á esta operacion una lijera retención de orina que cedió pronto.

El 18, cuando le ví, había ya orinado solo. Se encontraba perfectamente bien: temperatura y pulso normales; lengua húmeda, etc. Deseaba fumar.

El 24 de setiembre le saqué el apósito por vez primera. Habia alguna supuración

que se evacuó fácilmente por el tubo. Como hubiese alguna tumefaccion en la parte superior de la herida y alguna fluctuación, debridé el tejido cicatricial que empezaba á hacerse en ese punto; salió algun pus y puse un nuevo tubo de drenaje.

El 26 le curé porsegunda vez. Había muy poca supuración. Estado general satisfactorio. Marcha regular del proceso. Sale de alta el 15 de octubre en el mejor estado.

Respecto de la otra hernia, como era muy pequeña y la contenía muy bien con un braguero, convinimos en no atacarla por ahora.

Caso 11. Hernia ingüinal izquierda (correspondiente al caso 5° de hernia ingüinal doble); canalotomía; resección del saco; curación; recidiva á los ocho meses en el lado derecho. Se trata del enfermo de hernia doble de que me ocupé al principio de este trabajo (caso 5°) y al cual operé con el mejor éxito su hernia derecha.

Como ya he dicho es un alienado y su hernia izquierda, que en el principio era pequeña, creció considerablemente por causa de la operación en el lado derecho.

El sábado 1° de octubre de 1892 procedí á operar por segunda vez á este enfermo, ayudado por los Dres. Seco, Zeballos y Acuña y los practicantes Vatteone y Pizarro.

La operación empezó á las 9 y 30 a. m. y terminó á las 11 y 15 a. m.

Descubierto el saco que era bastante delgado y homogeneo, encontrando que el anillo era algo grande, hice la canalotomía. Siendo el saco delgado y transparente no quise deliberadamente abrirlo, convencido de que no había en su interior ni intestino ni epiploon y así integro le conservo en mi museo con la sola sección circular del cuello. Tomado el fondo del saco con dos pinzas y tironeado hácia arriba para ligar bien alto su pedículo, dicho saco, aplanado, formaba un triángulo isósceles con las siguientes aproximadas dimensiones: base, 6 centímetros; lados, 13 centímetros cada uno.

Omito describir los demás detalles operatorios para decir brevemente que este enfermo curó como todos los demás y que á principios de noviembre le permitía levantarse.

Solamente me detendré á hacer algunas reflexiones que reputo de gran importancia.

En esta segunda operación no me fué posible obtener la cicatriz de primera intención como en la primera (veáse 5° caso).

La canalotomía fué hecha en la segunda operación y no en la primera.

Ahora bien, este operado anduvo perfectamente bien durante ocho meses, especialmente espuesto á la recidiva por su condición de alienado en quien hubiese sido utópico pensar en la aplicacion de un braguero preventivo. La recidiva se ha presentado en efecto en los primeros dias del mes de marzo y llamo sobre esto la atención, *recidiva del lado derecho*, en donde la cicatriz fué por primera intención, pero en donde no se hizo la canalotomía, como se hizo en el izquierdo, en que se presentó la supuración.

La canalotomía es una modificación de última data que ha introducido Championnière en la cura radical de las hernias.

He practicado dicha canalotomía seis veces (casos 7°, 8°, 9°, 10°, 11°, y 14°) y en todos ellos no he podido obtener la primera intención, no sé si debido al número considerable de suturas en tan corto espacio de tejidos ó por algun defecto inapreciable en la antisepcia, pero precisamente en ninguno de esos casos ha habido recidiva. Ahora bien, Championnière insiste mucho en el mayor peligro de recidiva que existe en los casos supurados. En este último caso la recidiva se ha hecho precisamente en el lado en que no hubo ni una gota de pus, pero en el que no hice la canalotomía.

¿ Será que realmente esta consigue estrechar la puerta de salida de las vísceras aún sobre la base de una herida supurada ? ¿ Serán el ideal de estas operaciones, á los efectos terapéuticos lejanos, la canalotomía unida á la cicatriz por primera intencion? El tiempo y la experiencia lo dirán.

Caso 12. Entero-epiplocele adherente; herniotomía exploratriz; curación. "*Melius est sistere gradum quam progredi per tenebras.*" Es preferible detener el paso á marchar en la oscuridad. Juan Scaroni, argentino, de 25 años de edad, constitución robusta, ha gozado en general de buena salud.

Tiene una hernia ingüinal derecha bastante voluminosa. Diámetro vertical: 21 centímetros. Diámetro transversal y ántero-posterior: 12 centímetros, correspondientes, estos últimos, á una circunferencia de 37 centímetros y ½.

No recuerda bien cuándo apareció esta hernia, pero cree hace un año y medio, poco mas ó menos. Practicado el taxis, dos veces por mi y una por el Dr. French, mi colega del hospital, nos fué imposible reducirla. Hernia, pues, irreductible.

Resuelta la intervención quirúrgica, procedí á operar este enfermo el mártes 8 de noviembre á las 9 a. m., asistido por los Dres. Seco y Zeballos y algunos practicantes.

La anestesia fué dificilísima. Á las 10 y 30 a. m. pude empezar la operación (primer contratiempo).

El testículo se notaba en la parte inferior del tumor, en donde formaba relieve, pero llamaba la atención lo reblandecida y pequeña que estaba esta glándula.

Descubierto el saco, que estaba bastante adherente á los elementos del cordón espermático, elegí el punto mas blando para hacer una pequeña incisión por donde salió una regular cantitad (como 350 gramos) de líquido seroso.

Olvidaba decir que, en vista de la matitez y de la irreductibilidad que presentaba esta hernia, habia formado el diagnóstico de epiplocele adherente, diagnóstico incompleto como va á verse.

Las desadherencias exteriores del saco me dieron, como en ningun otro de mis casos, bastantes puntos hemorrágicos teniendo que poner hasta ocho pinzas hemostáticas y practicar algunas ligaduras (segundo contratiempo).

Hecha prudentemente la incisión del saco en una extension de 12 centímetros, encontréme hácia el lado derecho y cara anterior con un pelotón de epiploon adherente á la parte inferior, perfectamente libre hácia el canal ingüinal, lo que hubiese hecho fácil su resección juntamente con la del saco. Pero, hácia el lado izquierdo y posterior habia también un pelotón casi informe de intestino adherente de un modo sólido al saco (tercer y gran contratiempo).

Para determinar bien la naturaleza de este cuerpo adherente extraje del interior del abdómen algunas ansas de intestino delgado que le eran contínuas, por lo que, y por algunas franjas que pude notar en los intersticios de aquel magma grasoso, deduje ser el intestino ciego con su apéndice vermicular invisible lo que tenía entre las manos.

Erán las 11 y 45, á una hora y un cuarto del principio de la operación, que se me presentaba el para mí difícil problema de atacar la inserción intestinal en el cuerpo del saco.

No se improvisa así no mas una resolución de esa clase. Tuve dudas, vacilé y persuadido de que avanzar hubiese significado engolfarme en una aventura quirúrgica, preferí, con bastante desagrado por otra parte, hacer una operación incompleta á comprometer muy sériamente la vida del enfermo primero y despues á alterar la pureza de mi inmaculada estadística de once casos de cura radical operados todos con el mejor éxito.

Veremos mas adelante, me dije; consultaré la experiencia ajena, formaré resolución con calma sobre esta inesperada dificultad y si el enfermo lo consiente haré, en otra sesión operatoria, una segunda y final tentativa.

Entretanto queda esta primera parte como una *herniotomía exploratriz* que, á los efectos de la estadística en lo que se refiere á la gravedad operatoria de la cura radical, representa tanta ó mas importancia que un caso de operación completa, como le probaré mas adelante.

Reduje todo, suturé con cat-gut los bordes del saco y las túnicas mas inmediatas á él independientemente y luego la piel con crin de Florencia. Coloqué un tubo grueso de drenaje en el interior del saco. Curación suavemente compresiva.

El 9 de noviembre por la mañana el enfermo está muy bien. No hay reacción ninguna desfavorable.

Hícele curaciones diarias, acortándole gradualmente el tubo de drenaje.

El 28 de noviembre estaba ya en pié y me pedía permiso para pasar en su casa unos quince dias de descanso, antes de volver á someterse á una segunda operación si yo la juzgaba conveniente.

He dicho que hasta aquí es este todo un caso de cura radical, y como tal lo consigno en el órden numérico que le corresponde, pero, se entiende, con relación solamente á la gravedad operatoria y á la estadística, que es un punto importantísimo á estudiar en esta clase de intervenciones quirúrgicas.

Creo que este caso, del punto de vista de la gravedad operatoria, tuvo mas que los comunes, pues como en ellos se incindió el peritoneo y se manipuló el intestino y el epiploon y á diferencia de ellos, en vez de cerrar completamente á la acción exterior, por medio de una ligadura en el cuello, la cavidad peritoneal, se dejó un tubo de drenaje estableciendo comunicación del exterior con la cavidad del saco herniario, es decir, por propagación, con la cavidad general del peritoneo.

Caso 13. Hernia ingüinal derecha; apendicele; resección del saco; curación. Tomás Dominguez, español, 47 años. Hacen 27 años que le apareció la hernia. Ha usado y usa braguero. La hernia es reducible y coercible. Es una hernia pequeña. Desciende, haciendo esfuerzos, hasta la mitad del cordón.

Pide ser operado para verse libre de algunas molestias, y el sábado 12 de noviembre procedí á ello ayudado por el Dr. Seco y por el cabo de la sala D. Hugo Carletti.

Empezó á dársele el cloroformo á las 3 y 45 p. m. La anestesia era completa á las 4 y 30 p. m.

Practiqué una incisión de 5 centímetros. Aislado el saco en sus 5/6 externos, noté, hácia la parte interna, un cuerpo cilíndrico y algo duro. Abierto el saco, me encontré con que éste estaba ocupado exclusivamente por el apéndice vermicular del ciego. Dicho apéndice estaba libre en casi su totalidad. Solamente en su porción superior, á la altura del anillo ingüinal externo, estaba adherente á la pared póstero-interna del saco, mejor dicho, formando él mismo una parte de dicha pared.

Dime cuenta que la operación de cura radical, en este caso, no podría hacerse

tan amplia, por no poderse ligar el cuello del saco á la altura conveniente. Sin embargo, reduje el apéndice vermicular y ligué el cuello del saco lo mas alto que pude, concluyendo la operación como de costumbre.

La operación duró 1 hora y 45. No hice la canalotomía sobre cuya conveniencia no estoy decidido.

El enfermo siguió sin novedad, obteniendo, á los quince dias, una cicatrización completa por primera intención.

Caso 14. Entero-epiplocele adherente; desinserción del intestino; sección del epiploon; canalotomía; reduccion del intestino; reseccion delsaco; curación. Scaroni, el enfermo del caso 12º restablecido de la primera operación exploratriz, después de pasar una temporada con su familia, volvió al hospital, resuelto á someterse á la segunda intervención quirúrgica que le propuse y aceptó.

Ingresó al hospital bastante adelgazado y tomé como pretexto dicho adelgazamiento para diferir una operación que me inspiraba bastantes temores.

Por fin, y á ruego del enfermo, quien, á pesar de conocer el especial peligro que iba á correr, queria, no obstante "jugar el todo por el todo," resolví operarle el miércoles 11 de enero de 1893.

La operación había sido fijada para las 3 p. m.

Hacía un calor tremendo (34. 5° á la sombra).

No siendo puntuales los invitados se empezó á dar el cloroformo á las 4 p. m. y á las 5 p. m. recién estaba anestesiado el enfermo.

Acompañábanme los Dres. Enrique Mujica, Murphy y Zeballos, los practicantes Vatteone, Pizarro y Zabala y el hábil enfermero Hugo Carletti.

Practigué la incisión sobre la cicatriz. La cavidad vaginal contenía una gran cantidad de serosidad. La túnica vaginal considerablemente espesada y dura, por lo qual escindí de ella todo lo que pude. El saco herniario que, cuando la primera operación, era delgado, estaba también bastante grueso, presentando en conjunto todos los tejidos un aspecto de degeneración muy diferente del que tenían dos meses atrás. El epiploon, adherido en el sitio descrito (caso 12º), estaba apenas reconocible en su porción adherente, negruzco y algo endurecido.

Ataqué primeramente la porción intestinal herniada y adherida. Tironeando un poco hácia la parte superior salió de la cavidad abdominal una ansa de intestino delgado que hacia continuación con la parte implantada, pero, examinando á ésta prolijamente, no tardé en reconocer al intestino grueso por una de sus franjas apenas visible entre la atmósfera grasosa apelotonada y adherida. Diagnóstiqué: hernia del ciego con su apéndice vermicular, hipertrofia del tejido grasoso ó franja grasosa y adherencia al saco.

Resuelto á practicar esta vez la desincerción de estas adherencias, lo hice poco á poco, colocando algunas pinzas primero y despues ligaduras con cat-gut en los puntos que daban sangre. Deliberadamente no hice resección de tejido grasoso sino en los puntos en que era éste mas prominente. En seguida ligué bien alto el epiploon herniado previa extracción al máximum del interior del abdómen.

Los anillos y canal inguinales eran sumamente pequeños para dar paso al intestino engrosado por el pelotón adiposo, masa torpe y desprovista de aquella maleabilidad y poder de escurrimiento de que están dotadas las ansas intestinales en los casos comunes de hernia. Para salvar esta dificultad, seccioné anillos, canal inguinal y algo mas allá en la pared misma del abdómen, para lograr reducir aquel pelotón entero-adiposo, lo cual me dió bastante trabajo.

En seguida ligué bien arriba el saco con tres anillos de cat-gut y seccioné. Presentose al poco rato una hemorragia arterial que la atribuí á un ramúsculo de la epigástrica. Fué fácilmente contenida.

Eran las 8 p. m. cuando practiqué las suturas finales, quedando todo concluido á las 8 y 30 p. m.

El pronóstico que la mayoria de los circunstantes hizo respecto de este caso fué desastroso, participando yo tambien de la creencia muy posible en un fracaso.

El 12 por la mañana el enfermo se siente muy molestado con los vómitos dependientes de su larga cloroformización; pero no tiene fiebre, la lengua está húmeda y el pulso normal.

Ha pasado mala noche.

El 13 se encuentra mejor. Persisten algunos vómitos.

El 14, bien; no hay dolores, ni vómitos, ni fiebre. Obró abundante y espontáneamente. Habiándose ensuciado el vendaje con la orina resolví curarle. La herida en el mejor estado.

Los tejidos vecinos algo indurados ó inflamados.

Le permití tomase un huevo con el caldo.

El 19 volvió á mover libremente el vientre.

El 22 le curé. Disminuí el tubo de drenaje. Estado satisfactorio; desea levantarse.

En definitiva, y para dar una idea de la buena marcha del caso, el sábado, víspera de Carnaval, es decir, el 11 de febrero, salió del hospital sin mi aprobación, dejando dicho al cabo de la sala que deseaba tomar participación en las fiestas.

Dos meses depues he sabido que sigue muy bien.

APARATO DE BONNET MODIFICADO PARA LAS FRACTURAS DE LA PIERNA Y MUSLO.

Por el Dr. REYES G. FLORES, Méjico.

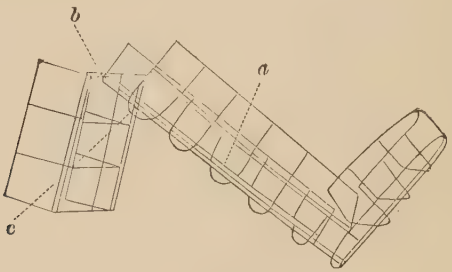

Fig. 1.—Aparato cerrado.

La regilla (*a*) está fija porlos lados abrazando por la mitad inferior los dos tercios de la pierna, de este punto se divide de abajo arriba, longitudinalmente, hasta la corva, en donde vuelve á dividirse trasversalmente y se articula en (*b*) con otra porción que llega hasta el trocánter (*c*), teniendo tambien divididos los lados longitudinalmente, cuyas divisiones así como las de la pierna, sirven para descubrir la pierna ó muslo, sin quitar el aparato y curar con comodidad al paciente, aun cuando las fracturas estén complicadas con heridas ó sean conminutas: la visagra de la corva (*e*) sirve para doblar la pierna y darle la inclinación que desee el paciente para descanzar, sobre un plano más ó menos inclinado, cubriendo la pierna con algodón,

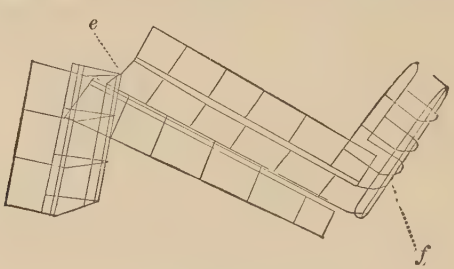

Fig. 2.—Aparato abierto.

sujeto con un vendaje de 18 cabos protejido por cogines; cerrando el aparato y colgándolo con unos hilos, queda espedito para mudar de lugar, con ayudantes ó solo, según el periodo de la enfermedad: el pié queda encerrado en la rejilla (*f*) inmóvil como una chinela.

PYOTHORAX AND ITS TREATMENT.

By CARL BECK., M. D., New York.

Among all so-called surgical diseases none shows a greater prevalence in this city than empyema. Its predisposing cause is probably due to the rapid variations of climate, which favors so much the development of pleuro-pneumonia. If it be true that figures demonstrate its prevalence, it becomes evident by the fact that, during a period of eleven years, I have performed resection of a rib in this city in 141 cases for empyema. You will find a great difference in the statistics of European surgeons. So, for instance, with the one exception of König (76 cases during twelve years), some of the most eminent surgeons furnish reports of between ten and thirty-five cases treated likewise during the same length of time.

The Universal Medical Journal, of Philadelphia, in its last issue, June, 1893, published the statistics of empyema treated by F. C. Holt, of Christiania, from 1874 to 1891. It impresses the reader that the 23 cases operated upon during this time were regarded to be a large number.

The St. Louis Clinique* does not disdain to draw classical rules from the observation even of two cases. That under the auspices of antiseptic principles the question is still pending whether aspiration, incision, or resection should be the treatment is a deplorable fact, the explanation of which, in my opinion, can only be found in the fact that the general practitioner is seduced to attempt the solution of surgical problems, which lead to the fields of speculation. One of the few glorious exceptions is represented by Gerhardt (as shown in his excellent essay about diseases of the pleura).

When, last year, I was visiting one of the greatest surgical clinics in Europe,† on inquiry I was told by the chief that only one case of empyema had been treated in the surgical ward during the whole year, as the other cases had to be under the attendance of the physician on internal medicine.

At the last Medical Congress in Vienna no less than six methods for treating pyothorax were still advocated; they were:

(1) The expectant treatment.

(2) Simple aspiration (done once or more), recommended by Silly, Ewart, Kapteyn, Peri, Hughes.

(3) Aspiratory puncture followed by antiseptic irrigation, recommended by Senator, Reichelt, Baelz, Kashimura.

(4) Permanent aspiration (Bülau's method), recommended by Subbotin, Bowditch, Immermann, L'yden, Curshmann, and Playfair, and modified by Phelps.

(5) Simple incision, recommended by Kussmaul, Bartels, Quincke, Ewald, Rose.

(6) Resection of one or more ribs, recommended by Roser, Kœnig, Schede, Bardeleben, Runeberg, Billroth, Rydygier, Weir, Bull, McBurney, Estländer, Ziemssen, Glaesser, Raczynski, Gerhardt.

There is no doubt that the latter method, resection, is gaining ground more and more, especially among and through the real professional surgeons, and it will be the endeavor of this paper, in analyzing the other methods, to convice you of their insufficiency.

It is particularly Kœnig who deserves the most credit for having first offered clear, simple, and methodical indications of a true surgical character.

The genius of my great teacher, Gustav Simon, even at the pre-antiseptic era, found a way to heal old cavities by resecting from three to seven long pieces of ribs, thus enabling the thoracic wall to approach the retracted lungs.

I may be allowed on this occasion to give this eminent surgeon, who performed the first nephrectomy, due credit for this ingenious method, which generally is attributed to Estländer.

The last year saw us admire Schede, who obtained satisfactory results by removing even the whole thoracic wall. Ribs had been perforated already by Hippocrates, the great master, and by studying his book, De Morbis, one can not help getting the impression that, long before him, opening of the chest-wall was a well-developed operation, the indication for which was well defined and must have also been based upon a very frequent and extensive employment of the different methods of incision by knife, cautery, or by perforation of a rib.

In the seventh book of the History of Nature, Plinius, for instance, describes the case of a certain Pharæus, who, after having been given up by his physicians, wanted to die on the battlefield. But when a spear was thrust into the chest pus escaped, and the seeker of death recovered—in fact being cured by the weapon in

*Arnot Spence, February, 1893.

†University Place, with 500,000 inhabitants.

the hands of his enemy. Euryphon, of Knidos, is supposed to have saved the life of Kinesios by opening his thoracic cavity with the actual cautery.

There can be no doubt that, based upon nearly perfect diagnostic means, such operations were performed frequently and successfully during the great Hippocratic era and that the most of its admirable knowledge had been lost during twenty-three centuries.

Is it not astonishing that Hippocrates laid great stress upon frequently washing the patient with warm water before the operation should be performed? Does this not appear like a dawning of aseptic principles, and explains so well why the successes of operations performed then were so excellent, that some are inclined to doubt their truthfulness?

It would suit the spirit of our sterilizing age to be reminded of the custom of frequent washing by our Hebrew friends, which was made a religious rite by Moses, who must have been the greatest connoisseur of human nature. It is a pity that just this doctrine is so poorly appreciated by some of his Russian offspring.

A slight impression of what we must have lost of the immense knowledge of the school of Kos, and how highly educated Roman surgery must have been, one may gain by visiting the so-called house of the surgeon at Pompeii. The streams of water which were constantly flowing through the streets of Roman cities were certainly apt to remove germs. But more than that—and I do not know if it has ever been mentioned from this point of view—the exceedingly large number of small wells in the house points to the more or less conscious knowledge of the principles of asepsis.

On a recent visit to this most interesting place I felt more than ever before how little advanced in fact we are in comparison with the medical civilization of many centuries ago. And why should not the ancient surgeon, with his fine art of diagnosis and with his powerful weapon—cleanliness—have obtained better results than the surgeon of not many years ago, who went directly from the autopsy room after having washed his hands, *secundum artem*, in a questionable fluid, to the operating-room, repeating his anatomical masterpiece on the living subject, and—with the same effect?

It is not at all astonishing that Sedillot, who brought the operation for pyothorax to light again, was not greeted enthusiastically. His results were so discouraging that the greatest surgeon of his time, Dupuytren, when suffering from pyothorax himself, being advised to be operated upon, declared that he would rather die from the hands of God than of the doctors. Bearing in mind that Velpeau had lost all his cases, and that of 50 cases of empyema he had only seen 4 recoveries, we may well appreciate his conviction.

Later on Sedillot and Langenbeck recommended trepanation, Roser resection. But, as a rule, even among such surgeons as were in favor of resection, it seemed still to be understood that resection should especially be done in adults, while aspiration or incision should be preferred in children, because of their greater tendency to recovery. When I, nearly eight years ago, as far as my knowledge goes, for the first time,* emphasized the adoption of the method of resection for all cases of empyema, without regard to its original cause or to the age of the patients, in a paper before the German Medical Society of this city, my views were received very unfavorably. There was indeed not one gentleman present who had not obtained so and so many excellent results by aspiration or incision, that it was a crime to mutilate poor patients by resection without any necessity, and at the end of the discussion I had the feeling that the condemned Shylock was a nobleman in comparison with me.

It is a great satisfaction to me to know that several of the gentlemen present at that time are now of the same conviction as myself, and it seems to be difficult for them to remember that they ever were possessed of a different one. At the same meeting I, on the strength of 21 cases, maintained that the main indication for resecting a rib was not only, as usually supposed, furnished by the necessity of having sufficient drainage or to induce the thorax to approach the pulmonal pleura, but for enabling the surgeon to introduce his index finger, thus making it possible to palpate the pleural walls.

It is, as I repeat to-day, indeed the only procedure which with certainty shows the presence and allows the immediate removal of clots consisting of fibrinous or

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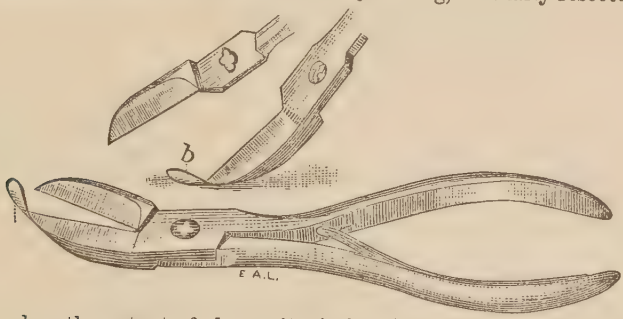
*Cf. New Yorker Medicinische Presse, December, 1886.

cheesy products attached to the pleura. My experience has shown me that in nine out of ten cases I could be certain to find such lumps—at an average of goose-egg size—free in the cavity as well as fastened to the pleuræ.

As long as we have no physical, mechanical, or speculative means to distinguish between this condition and a simple collection of pus, or so long as we can not liquefy these lumps by the use of a dissolving injection first, aspiration and even incision are insufficient and therefore unsurgical procedures. I tried to dissolve such masses by the injection of pepsin, but without avail, as the resection later showed clearly. In three such cases large clots were found afterwards. Anesthesia was only administered when the pulse was strong. Generally caffeine was given before. In the greater number of cases the operation, which can be done in a few minutes, was performed under ether spray.

If the patient or his relatives are adverse to the seeming cruelty of this treatment, their attention can be called to the immense dangers to which an anesthetic might expose the organs of the thorax, the functions of which are so much impaired already by their compression. Not more than one or two drops of chloroform should be poured into the mask, the smell of which often gives the patient the agreeable impression of getting or being insensible. This may explain why I never met with an accident during operation.

As the diaphragm after evacuation is always rising, I usually resected the sixth



rib. Only when the extent of the cavity is found to be very small, I incise above the same, using the aspiratory needle as a guide for the incision. As a rule, between the anterior and posterior axillary line—under antiseptic precautions, of course—I make an incision about 3 inches long, which at once divides the periosteum. From here the thoracic walls can be palpated equally well anteriorly and posteriorly. Furthermore, the patient, when brought on the edge of the table, can assume the dorsal decubitas; while, if the incision should be made farther back, he would lie on the healthy side, which on account of the pressure of the effusion would expose him to great danger. Then with a small curved elevatorium I lift the periosteum from the rib, which then is pushed underneath the rib so that the rib rides on the instrument. A blunt hook retracts the tissues alongside the rib toward the axilla. One blade of a bone scissors is introduced below the rib between hook and elevatorium, and the same cut through. Then the elevatorium is pushed toward the sternum, thus forcing the rib from the last fragment of adhering periosteum, the hook inserted opposite to the wound, and with scissors the same manœuver is repeated. If my own elevatorium shears (see cut) are used, it is only necessary to tear away the connection between the periosteum and the rib and cut the rib through, the instrument being of such a shape as to keep the tissue properly retracted. The one blade, if separated, can be used as an elevatorium, so that, without having anything else on hand than a knife and this scissors the whole operation could be performed. A piece long enough to allow the introduction of the finger suffices.

It is impossible to strike the intercostal artery during these manipulations. Iodoform (as a powder or as a saturated solution in ether) is then distributed above the wound surface, to prevent infection from the pus as it flows from the cavity.

Through a small opening made into the pleura with a bistoury a Pean forceps is introduced and the pus slowly evacuated. A sponge is pressed against the opening from time to time to interrupt the stream, to avoid a too rapid expansion of the lungs. (The time of evacuation should be at least twenty minutes.) The finger is now introduced, and lumps, which are now probably found to be adherent to the pleural walls, are wiped off with the index finger or with a blunt spoon made for this purpose (like a spoon for stone in the bladder). If bleeding should occur, this may be deferred for two or three days. An irrigation of a bichloride solution (1 to 5,000) is used mainly for mechanical purposes; that is, to evacuate thoroughly. The pleura is then stitched to the skin with four iodoform silk sutures, forming a mouth (pleurostomy.) These sutures at each edge of the wound and two opposite ones at its middle are generally sufficient to cover the wound surface, to prevent secondary hemorrhage, and keep the opening large. Some iodoform powder is put into the cavity to reduce the secretion, then the wound is covered with iodoform gauze. The whole side is protected by a pasteboard-like piece of sterilized moss, which, after being slightly dipped into a solution, adapts itself to the contour of the body like a plaster of Paris dressing. A strip of rubber adhesive plaster keeps it tight, so that no air can enter. During respiration it acts like an aspirating valve and absorbs at the same time. After three days a rubber drainage-tube, of the size of a man's index finger, secured by two large safety-pins in the shape of a cross, is introduced. I have refrained from introducing it immediately after operation, since I have witnessed considerable bleeding from it. Undoubtedly the constant respiratory movement of the pleurae causes irritation in the way of rubbing. It seems that after the pleurae become more accustomed to the contact of the atmosphere, as soon as granulations appear, they stand the irritation well. As the cavity is, indeed, entirely emptied after the operation, there is no necessity of washing it out afterwards. As an average, two weeks after the operation a smaller drain is introduced, which gradually has to be shortened. When the serous discharge becomes scanty the drainage-tube may be left out and a small strip of iodoform gauze introduced. For the following few days the patient has to be watched very carefully. It may be that the cavity is obliterated the following day, but very often union is only superficial and retention of pus occurs, as an expression of which an elevation of temperature will be noticed.* Then, of course, the drainage-tube has to be introduced again, and after a week the same manœuver must be repeated, until four days after the obliteration no secretion has been showing up and the temperature has remained normal. In doubtful cases the grooved director may reveal the presence of retained pus. The patient should always lie on the diseased side of his thorax, and should be lifted up by the feet about every four hours, so that the pus will flow into the dressing. This renders the procedure, as advised by Küster, unnecessary, to make a counter opening to avoid the retention of pus. There is no reason for introducing the gauze into the cavity.

The dressing has to be changed twice a day for the first week, later on once a day and after three weeks only every second, third, or fourth day. The patient, if in any way possible, should get up after one week. The thermometer is controlling the treatment, i. e., the change of the dressing. During the after treatment for the first few days small doses of morphine are administered for the purpose of immobilization. If the pulse be weak, strophantus or caffeine may be given at the same time. Later on, syrup. ferri iodid. or cod-liver oil is ordered. Nourishment is given frequently in small quantities to avoid distention of the stomach. Great stress is laid upon the necessity of gymnastics to prevent curvature. My experience leads me to the conclusion that simple empyema, operated early, will only under extraordinary circumstances turn out unfavorably. In other words, the chances of an empyema depend entirely upon the early diagnosis by the general practitioner. The diagnosis of empyema has to be made by the aspirating needle. If there is

* Cf. history of Case XIII.

much cheesy accumulation, or a small cavity, or if the fluid be encysted through the division of the cavity by adhesions, it has to be introduced quite often on different portions. I sometimes have explored ten times before I could corroborate my suspicion. I found it useful, when I could not draw any pus, to push the wire through the needle, a procedure which sometimes made a trifle of pus appear on the end of the needle.*

After deducting the 24 cases published seven years ago, 117 remain in this series. Among the cases 39 were below 3 years; 32 were between 3 and 5 years; 19 were between 5 and 10 years; 10 were between 10 and 16 years; 17 above this age. Of them 12 died above 16 years, 5 from tuberculosis; 98 were simple acute cases, 19 were complicated. Among 5 double-sided, 4 recovered.

In the case of a child 2 years of age, where I had operated one year ago, and where recovery was perfect four weeks later, I had to perform a resection after a second pleuro-pneumonia only four weeks ago on the same side.

All the empyemas with offensive odor (4 cases) died.

The average time of the healing process was five weeks. Recovery of a baby, aged 6 months, was perfect after six days.

Among the cases of simple empyema (collection of pus—*bonum ac laudabile*—following an acute inflammatory process in the lungs or pleura) in 63 the diagnosis was made early. These cases recovered without exception.

Among the 37 cases which were diagnosticated late, 5 showed the typical vaulting of the thorax. (In two of them a fistula remained; one of them died after resection of seven ribs.)

In 6 cases I was doubtful whether tuberculosis was causing the empyema, or if the long standing of the latter did not cause the tuberculosis. In fact, I can not understand how an accumulation of pus could occupy any portion of the body for months without causing sinister manifestations.

Two cases where tuberculosis was diagnosticated, and therefore considered nonoperable, recovered after resection. So they, according to the wisdom of the dissuading capacities, had, as one would imagine, been treated wrongly.

Based upon this experience (similar cases respecting cures are reported by Schede and Güterbock),† I repeat that resection of a rib should be performed whenever the presence of pus has been verified by the exploratory needle, no matter if tuberculosis is confirmed or not. What harm can be done by resection? A consumptive has nothing to lose and everything to gain.

As before alluded to, the differentiation between tuberculosis and simple empyema is not so easy as it seems on superficial contemplation. An abnormal condition, for instance, at the apex does not necessarily show the tubercular character of the empyema, and *vice versa* bronchial breathing, râles, and bronchophony during auscultation, the symptoms of compression as well as forced pectoral fremitus, can all be due just as well to a tubercular infiltration of the lung tissues.

I may, for instance, relate the following history: A machinist, 26 years of age, showing an excellent family record, took sick suddenly, never having been ill before, with a chill and nausea. Pleuro-pneumonia developed, which ended by crisis. Perfect recovery, however, did not follow, but the patient went around for three months while suffering from slight dyspnœa and low fever. Four months after the onset of the pleuro-pneumonia I had a chance to perform resection, but three months later the patient died from tuberculosis. Now, was the acute inflammation already the expression of commencing tuberculosis? Hardly!

In the cases of so-called stinking empyemata other serious suppurative processes had been present. So it may be that the patient succumbed to the multiple pyæmic foci. So if I abstract the deaths caused by pyæmia and tuberculosis, only 5 cases, including the 3 Estländer operations, remain, where I can attribute the fatal result directly to the consequences of the operation.

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* Cf. history Case IX.

† Cf. Berliner klinische Wochenschrift of June 27, 1892, p. 655.

My results of the so-called Estländer's operation were little encouraging. Among 5 cases where I had to resort to it, I saw only 1 recover perfectly (3 died) * and another is still mourning his fistula.

In a case of thoracic fistula, existing for two years, I recently tried the following osteoplastic experiment: On a man, 36 years of age, who after an attack of pleuro-pneumonia suffered from pyothorax, resection of a rib was performed only after repeated aspirations—that is, about six weeks after the onset of the suppurative process. The cavity did not fill up and a fistula still remained fifteen months after the resection. At this time the cavity would hold about a pint of irrigation fluid. The fistula was situated 1 inch behind the right anterior axillary line at the level of the seventh rib. Probe and finger introduced into the dilated fistula canal proved that the cavity extended from the second to the eighth rib. Laterally in its center it reached from the posterior axillary line forward to about an inch to the inner side of the sternum. According to my determination I made a semilunar incision from the upper margin of the second down to the upper margin of the eighth rib, dividing all the soft tissues at once. The beginning as well as the end of the incision was situated at the anterior axillary line. The middle of the segment nearly touched the sternum. While sharp hooks retracted the soft tissues, the periosteum was incised around each rib and with an elevatorium it was freed from its attachments. The rib was divided then with the bone shears. In this manner the third, fourth, fifth, sixth, and seventh ribs were cut through in the direction of the semilunar incision. Then they, still in their connection with the periosteum, could be pushed down into the cavity to a considerable extent. If I had had any difficulty in dislodging the ribs I would have resected pieces of them. The bleeding was insignificant. A very tight dressing, consisting of sponges and boards of moss, pressed the fallen-in ceiling of the cavity inward, which had been previously scraped and was slightly packed with iodoform gauze (but only toward the dorsum). Every second day the dressing was changed and pressure made upon the flap. The patient's condition was not impaired by the procedure, and three weeks after the cavity would hold only three-fourths of a pint.

Originally it had been my idea to make semilunar incisions, according to the periphery of the cavity, anteriorly as well as posteriorly at the same time, but the fear of insufficient nourishment of the flap prevented me from doing so. Therefore, I preferred to divide the same ribs further back twenty-four days after the first operation, when the condition of the depressed portion was such that I could expect the circulation to be well restored. Now the sunken-in area forms a deep depression. In proportion to this, 2 tablespoonfuls of the irrigation fluid is retained only by the cavity. The patient's general condition was very much improved.

It seems that I am justified in hoping for a permanent obliteration. Of course the adaptation of the thoracic wall to the pulmonary pleura is not as thorough at once as after total resection, but it is evident that, if my experiment proves to be a success, the patient enjoys the great advantage of not having suffered the loss of his bony support. At the same time I may call attention to the scant loss of blood, and especially to the impossibility of interfering with the intercostal arteries. (Further remarks about this case I reserve for a future communication.)

In reference to sero-fibrinous exudations I may state that I do not approve of resection as recently recommended in Germany. In this connection I may say that in two cases I have injected a 10 per cent mixture of iodoform in glycerine, with success, into the pleural cavity, after having aspirated first.

In reference to the etiology, I found pleuro-pneumonia occupying the front rank. Among the complete histories I found it 84 times, 29 times after influenza; scarlet fever, 8 times; puerperal processes and other septic infections, 4 times; whooping-cough, twice; and diphtheria, once.

* Cf. histories.

As far as the pathological significance of empyema is concerned, I acknowledge that it is very different. The etiology as well as the extent of the exudation, the kind of pus (if thin, thick, smelling, or putrid), the age and constitution of the patient, the pulse, the temperature, the digestion, the subjective condition of the patient, and the stage of the disease, have all to be taken into consideration. Furthermore, it is of great importance to know to what particular microbe the empyema is due; that is, if to the streptococcus, the pneumococcus, the tubercle bacillus, the typhoid bacillus, to the staphylococcus aureus or albus. Some empyemas contain simultaneously several forms of schizomycetes.

Netter, in 109 empyemas, found: Streptococcus, 51 times; pneumococcus, 32; sapropleytic organisms, 15; Koch's bacillus, 12. About half of all empyemas contain streptococci. As this microbe is most commonly found in suppurative processes, and has its domicile constantly in and on the most healthy persons, it is self-evident that it frequently will be demonstrated in pyothorax.

It seems that it especially tends to the formation of solid masses. Its predilection is for the infectious diseases of adults. The pneumococcus of A. Fränkel is more prevalent in the primary empyemas of children. About 25 per cent in adults and 75 per cent in children.

This form of empyema shows the most benign character among all, so that some are inclined to attribute this to the microbe; but it seems to me that the vitality of the organs and the compliance of the thoracic walls are the main causative factors of the more benign character of empyemas in children. The absence of the tubercle bacillus does not prove the absence of tuberculosis, as it very often is not found. There are empyemas where only Koch's bacillus is found, and there are some where streptococci, staphylococci, and several mixed forms could be discovered. In the latter case tuberculosis has repeatedly been diagnosed by other methods. There is still left a good deal for future investigation, to make these microscopical examinations more useful for the surgeon.

All these points certainly influence the prognosis as well as the after-treatment, but certainly could not prevent me from performing the resection, as long as there is the slightest hope for recovery. As long as our diagnostic means are so insufficient that we never are able to know, before the operation, exactly if the lung will expand in proper time or not, we from the start must make our arrangements in such a way that we can meet all eventualities afterwards.

It is certainly very disagreeable if the patient, for instance, has been promised to be cured by incision, and then the ribs approach each other so much that drainage becomes imperfect and resection must still be done weeks after the incision! An occasion like this will hurt the reputation of the surgeon to the greatest extent.

Among the accidents I have witnessed I may mention that no less than four times I have been called to extract drainage tubes which were imperfectly secured (such as by one safety pin), or where the rubber was of an inferior quality, so that breakage occurred. Once I removed a drainage tube, 9 inches in length, a year and a half after operation by Bülau's method.

Breakage of a poor rubber tube, however, occurred to myself once, but fortunately I was able to grasp it with the forceps the moment it slipped off.

Once I assisted a general practitioner (cf. history below) who, when trying to stitch the pleura to the skin, broke his needle. I fortunately was able to extract the fragment from the cavity, where, on a level with the second rib, it was already driven into the lung.

In analyzing the six different methods mentioned above, I can hardly say anything else about the value of the so-called expectant treatment, than that I regard it to be a crime. How men of the standing of a Leyden can maintain that empyemas, following pneumonia, are very quickly absorbed as a rule, I fail to understand. I hold exactly opposite views—that is, that absorption takes place only under the most exceptional circumstances; and if it really does, it seems to me to be a great misfortune

for the patient, because this procedure most probably furnishes the first step in tubercular infection.

P. K. Pel * mentions that the principle, *ubi pus, ibi evacua*, has justifiable exceptions, and that if empyemata be of small size, if the general condition of the patient be excellent, the pulse slow and well filled, if no fever be present, and the appetite remain good, absorption through thickening can be expected. Now, if one should recover from such a healthy disease without having used the exploratory needle, diagnosis will certainly be doubted; and, on the other hand, if an aspiration should have yielded pus, who will dare to recommend expectant treatment? Simple aspiration is to be condemned because it may only cure some of such cases, where no clots are present; and, as we have explained above, we have no means of knowing of their presence otherwise than by making an opening which allows the introduction of the finger. It is a hazardous procedure. When Pel says, "We, without performing resection several times, had perfect results," I may answer that I hardly know of any disease which, no matter how badly it was treated, has not occasionally been cured in spite of bad treatment. It is a pity that the advocates of the aspiration never have an opportunity to see the clots, and therefore they are under the impression that there are no such things in existence. They are satisfied in aspirating a certain amount of liquid pus; the patient is relieved and gladly submits to a second and third aspiration, because a stab with the needle is indeed no operation, and the most unsurgical physician can perform it.

If the patient could with his intellectual eye see the lumps in his pleura, common sense would teach him, the layman, that they never can be aspirated. But as it is, he will be aspirated so long till he is emaciated; and he is sucked, in the truest sense of the word, till the lungs become contracted. Then, as a last resort, resection may be recommended, which at this late stage, when the expansion of the lungs is so much interfered with, usually proves to be a failure.

From this the aspirating enthusiast deducts that resection is an operation which yields a bad prognosis, and that "he never saw a good result from it." Albert says very well, in reference to aspiration:

This procedure is analogous to the pumping out of other abscesses, for instance, suppurating buboes. In such cases a variety of aspiratory instruments have been tried, and once in a while a cure was effected.

The only courageous and clear treatment is the broad opening.

This whole surgical business is strictly analogous to the interference of a badly trained midwife. It is a great satisfaction to me to state that, among my personal professional friends, I have been able to convince every one of them of the incorrectness of aspiration, although they all, more or less, had experienced a few results with it. For conviction I needed only to invite them to a resection at the hospital, and when they had seen me remove the clots from the pleura they confessed they did not have the slightest idea of their existence, otherwise "they would not have tried their adventurous policy."

Aspiration, however, is by no means an innocent manipulation. The irritation in the pleural cavity may produce epileptic spells, vertigo, nausea, fainting, and even fatal collapse. At the same time a nervous physician may interfere with an intercostal artery. (As reports show, death has occurred repeatedly through extensive bleeding.)

Upon aspiration, followed by irrigation, only a few surgeons rely, so far as my knowledge goes. The idea to wash out solid particles is, of course, a very good one, but regarding the large size of the lumps, the evacuation through the small tube is absolutely impossible. Therefore, this method, which fifteen years ago was received with great enthusiasm, has dropped into deserved disuse, and in fact is identical with simple aspiration.

Nearly the same can be said about the aspiration followed by permanent drainage (Bülau's method). In cases of simple empyema of short standing, where the lungs still expand easily, or wherever there are no lumps present, this method would be

*Zeitschrift für klinische Medicine, p. 211. Berlin, 1890.

the ideal one. It consists in puncturing the pleural cavity with a trocar, into which a rubber tube can be introduced, this being long enough to reach a bottle partially filled with an antiseptic solution.

Analogous to the syphon-drainage after lithotomy, the pus should be constantly aspired, as negative pressure in the pleural sac is caused. But as the lung question can not be settled before a free opening is made, this method is nothing but an interesting experiment, although the author's results deserve attention.

It is certainly very interesting that once in a while fibrinous products, especially when tightly attached to the pleural walls, can slowly be absorbed. But as we, in fact, are not at all able to judge the conditions under which this takes place, and furthermore, as we, while trying to find out if the solid masses will be absorbed, or if we must not resect anyway, are losing so much precious time, it is only little better than the simple aspiration. Besides it is very probable that the absorption of the cheesy masses, if it exceptionally should occur, would favor tuberculosis. The tube, however, becomes easily displaced, so that its main advantage—the hermetical exclusion of the air—is void. Finally, the treatment can only be carried out in a hospital.

The method of simple incision has still many advocates, who claim that a small incision suffices. Furthermore, any general practitioner could perform the operation; while resection, a very difficult and mutilating operation, would require the skillful hand of an excellent surgeon. Resection should therefore be only performed in such cases where, after several months' treatment, the ribs have approached each other so much as to make drainage impossible.

In reference to the first point I may say, that if we open an abscess nowadays, we do not think that a small opening suffices, but we make the incision as broad as possible. Indeed, so wide that, if we have a chance, we try to overlook our whole field of operation. We may palpate the walls of the abscess and find, besides its thin lining membrane, necrotic tissues. After having noticed them, the immediate removal is a matter of course. Only after this do we mean to have evacuated our cavity thoroughly. Then we do not need to wash it out every day, as only a serous secretion is to be expected, and the natural sequence is a perfect and quick recovery.

Would a surgeon have the audacity to lance a large abscess anywhere else, to introduce a small drainage-tube, and to wash it out every day? Such surgeons perhaps change their antiseptic fluid once in a while, assuming this perhaps to be the cause of the insufficient progress? And where is the difference between this and a pleural abscess?

I am not able to overlook the field of operation and to introduce my finger into the pleura after incision. I can wash out small but no large clots, and it is impossible to diminish them inside. Furthermore, I can not detect those clots which adhere to the pleural walls. So they undergo fermentation and if the patient's condition stands it, they become decomposed, and until then, under repeated febrile elevations become dissolved and are then washed out. Therefore irrigations can not be dispensed with, which are destroying those very adhesions which we need so much for the obliteration of the cavity. How important these adhesions for the agglutination are, has been emphasized already in 1865 by Dr. A. H. Smith, of this city.

That retention of pus is always present in this condition is self understood. In regard to the difficulty of the operation, I am confident that herniotomy or tracheotomy, operations which every general practitioner should be able to perform, are much more difficult. As far as the possibility of interfering with the intercostal artery is concerned, this accident, on account of the anatomical situation of the same, happens much more easily than during resection. The incision is only made as far as to the periosteum. Then with blunt instruments the tissues, in which the artery is embedded, are pushed aside, so that it can easily be seen and avoided. For the same reasons there is no loss of blood, while after incision through the intercostal space, fatal bleeding has repeatedly occurred. In reference to the scarcity of the moving together of the ribs, I find that this condition is the rule. In fact, it is a healing process, it is the healing tendency of nature itself

which makes the ribs approach, and so the remedy itself in this case is a prevention of the cure, because it occludes the opening.

Altogether, the only rational method of treating empyema is the subperiosteal resection of a piece of rib. It is a clean, easy, safe, and nearly bloodless operation. It guarantees a large opening for a sufficient length of time, and the resected piece, if the periosteum has been preserved, is always restored. Scoliosis I have never observed, with the exception of one case of Estländer's operation:

Among the histories I may report the following:

Case I.—Mrs. B——, aged 56, a widow, shows a healthy family record. In April, 1882, she had an attack of pleuro-pneumonia, which was followed by pyothorax. After several aspirations, each of which gave temporary relief, I was asked to make an incision. But I insisted upon performing resection, which was done in presence of Drs. Waechter, Stutzer, and George Stiebeling, of this city. During the three weeks following the operation hectic fever was almost continually present, which weakened the patient considerably. Irrigations were made daily. Nearly every third day, I confess to my own shame, I tried another irrigation fluid, in the erroneous supposition that "*in hoc signo*" I would be victorious. In this manner I used boric acid, salicylic acid, acetate of alumina, carbolic acid, chloride of zinc, and at last, in my despair, even made irrigations with solutions of tinctura iodi and argenti. nitratis. with a bad result, of course.

Just by accident I happened to introduce my finger to palpate the pleuræ. To my great surprise I found a large amount of adherent tissues, which I instinctively removed at once. On the following day the temperature was normal, and after a few weeks the healing process was perfect. So far as I know, the patient is still enjoying good health.

This case taught me to carry out the principle of cleansing more extensively *a priori*.

*Case II.**—A. L——, a girl aged 1 year, sickened with pleuro-pneumonia on the right side. Pyothorax followed, which was recognized by Dr. A. Aronson, of this city.

Five weeks after the onset of the inflammatory process I performed resection. Six weeks later healing was perfect. Two weeks afterwards pleuro-pneumonia developed at the opposite side. Resection of a rib was performed fifteen days after the beginning of the pleuro-pneumonia for an empyema of small extent. Lumps were present this time as well as at the first operation. Recovery took place three weeks after the operation, while being treated as an outdoor patient.

Case III.—M. R——, a boy 6 years of age, took sick with acute inflammatory symptoms which were supposed to be dependent upon typhoid fever. Four weeks later Dr. L. Haupt demonstrated the presence of pus. Resection was done immediately. Lumps were present. Recovery was nearly perfect, when, four weeks thereafter, the parents suddenly left for California, where, as it seems, through great negligence, a fistula became established. After four years' stay the patient returned to New York, where I found him in a desperate condition. The old fistula led into a cavity which extended from the second to the fifth rib and from the margin of the sternum to the right anterior axillary line. After having resected the second, third, and fourth ribs correspondingly, perfect recovery took place five weeks later.

Case IV.—E. F——, a girl 14 years of age, suffered from pyothorax after she had gone through a pleuro-pneumonia, as stated by Dr. A. H. Stiebeling.

Four weeks after the onset of the acute symptoms resection of a rib was performed by me. (Lumps found.) After three months I was summoned again, as a discharging fistula still existed. I dilated and scraped. After an absence of five months I saw the patient again. Now I found that an assistant had performed resection of the sixth and seventh ribs, but only to the extent of a half inch, just to "make the rib sink in," as his idea was; but this scheme did not work, as the same *status quo ante* was still present. Now, I resected a very long piece of the fifth and two shorter ones of the sixth and seventh ribs, corresponding with the roof of the cavity, which would hold about 3 tablespoonfuls of fluid. Four weeks thereafter recovery was perfect.

Case V.—Miss E. L——, 33 years of age, of good family history, took sick with chills and sharp pains in the right side. She had coughed a good deal, and about three weeks after the onset of the disease (undoubtedly a pneumonia) was able to be about again. After this she was treated by her physician for two months, but only occasionally, until chills and pain in the right side compelled her again to stay in bed.

Dr. L. Weyland, who was called in now, found a prominence of the size of a man's fist at the right thoracic wall, the center of which corresponded with the sixth inter-

* Case presented to the German Medical Society, March, 1890.

costal space. The diagnosis of an empyema necessitatis was made then and an operation performed by me without delay. Considerable improvement followed, but a fistula remained, which in spite of repeated scraping, gymnastic exercise, and pneumatic treatment in Williams's cabinet, could not be obliterated. Therefore I undertook a resection of the fifth and sixth ribs to the length of 5 inches, as corresponding with the middle of the roof of the cavity. This was followed by a considerable decrease of the secretion, but still a year thereafter the cavity had not filled up.

Two and a half years after the onset of the disease I performed a third resection (St. Mark's Hospital). After the patient had inhaled only a few drops of chloroform pulse and respiration stopped. It was a long time before we succeeded in resuscitating the patient. I now, without administering any further anesthetic, resected four ribs more (third, fourth, seventh, and eighth). The very large opening was covered with iodoform gauze. After the operation was over the patient, still lying on the operating table, overwhelmed me with the assurances of her gratitude, a fact that shows clearly that she did not consider the omission of further anesthesia to be a cruelty. Six months later the cavity had become so small that it could hold only one-half table; oonful of an irrigation fluid. In accordance with this the patient's general health was excellent. In spite of the removal of seven ribs altogether, only a very moderate lateral curvature could be noticed. During the epidemic of spring, 1891, she became affected by the influenza, to which she succumbed quickly.

*Case VI.**—A. N——, 30 years of age, from a healthy family, took sick with repeated chills, disturbances of digestion, and rapid emaciation. He was treated first for malaria at his home in South Carolina, but when a slight cough set in he was supposed to be tuberculous, wherefore he was sent to New York, as at this time, under the jubilee hymns of the Koch Tuberculin era, an antituberculous institution had been established. There, however, in spite of the hyperactivity of the hypodermic syringe, the art of diagnosing had not been forgotten, and it was recognized that an abscess, originally situated in the liver, had perforated into the pleural sac.

The patient was brought to my department in St. Mark's Hospital, where I, after having performed resection of a rib, could make out a cavity of the size of a goose egg in the parenchyma of the liver. The communication with the bronchi could be demonstrated by irrigating an antiseptic fluid. The first few times when I did this the patient got such a severe attack of cough that he became dark blue in the face, and dyspnœa was so serious that I was very much alarmed. Finally, we both became accustomed to this phenomenon, and I could frequently demonstrate before my students the connection between cavity and lungs by irrigating. Six months after the operation the patient had gained 30 pounds, but there was still a cavity, wherefore I resected two ribs. Hereafter the cavity became smaller. I then lost sight of the patient. His general condition was excellent.

Case VII.—E. W——, boy, 6 years of age, shows a good family record. Three years ago I was called twice to perform intubation resp. tracheotomy for laryngitis. Each time I postponed the operation, and, as it is evident, with perfect success. (If intubation had been done the result would certainly have been a good one, and it would naturally have been supposed that it had saved the patient's life.) Now, after a preceding pleuro-pneumonia, empyema had developed, which was aspirated without success, as usual. The house physician was desirous to perform a resection himself, and asked me to lend him a helping hand. Everything went on nicely until the operator, too ardent in his desire to get the needle through the pleura, drove the needle into the rib so that the needle broke. The fragment could not be found. Although the optimistic colleague assured me that he saw it fall on the floor, I insisted upon palpating the pleural cavity. Here I soon discovered it at the level of the second rib, where it, being an inch long, had already perforated the lungs. As the sixth rib had been resected, I could just reach it with the tip of my index finger. By pressing it against the thoracic wall I at last succeeded in dislodging and making it fall down during inspiration. I had already given up hope of catching it this way, as I was afraid to push it farther inwardly by the use of a forceps during the respiratory movements, and had, therefore, thought of resecting the second rib. The patient recovered in spite of all, and as it is my principle never to allow a member of the family to be present during operation, this incident passed unnoticed.

Case VIII.—O. F——, boy of 15, took sick with pleuritis five weeks ago. The effusion first was of a serous and later on of a purulent character. When I was consulted by the house physician, I found the patient somnolent, in cold perspiration and with great dyspnœa. The temperature was subnormal and the pulse could hardly be felt. The exudation extended over the entire half of the thorax. I declared that under these circumstances the operation should be performed without delay and without an anesthetic. To this latter proposition the house physician

*Demonstrated before the German Medical Society of the City of New York, June meeting, 1892.

objected most emphatically, especially because the father objected to the cruelty of such a procedure. When I declined to intermingle in this aspect of the question altogether, the colleague reproached me with injuring him in his position as the family physician.

I can not spare myself the blame of having been thus intimidated and having sacrificed my scientific conviction to etiquette.

The punishment, however, was not long in forthcoming; after the patient had inhaled only a few drops of chloroform, the respirations, heretofore so frequent, stopped entirely and the face became cyanotic. I had insisted upon administering the anesthetic myself, and was at once ready with tongue-forceps, dilator, and electric apparatus. With this armamentarium and artificial respiration, I after half an hour's work, resuscitated the patient. Then the operation could be performed without any objection to the not administering of the anesthetic, so that at last the patient did well.

This was a good lesson for the colleague as well as for myself.

Case IX.—S. R——, girl of 10, four weeks after the onset of pleuro-pneumonia was aspirated for empyema in a hospital of this city. One week later an incision was made. When six months hereafter recovery did not take place, a resection was performed. This was done with a chain saw, and just as much of the rib had been removed as to enable a thin lead pencil to slip through the opening. Into this small canal a rubber drainage tube of the thinnest caliber was confidently introduced, which after it had courageously resisted the permanent rush of the retained pus, at last resigned and broke beneath the safety pin, which alone kept it *in situ*. As the parents moved just at this time to Long Island, the dressing was not changed for nearly a whole week.

It was reserved to Dr. Voegtle there to ascertain the error loci of the drain fragment. With his aid I performed a more thorough resection, and could then, as introduction of my index finger was very easy, extract the fugitive tube without any trouble. Scraping off a large amount of granulations completed the procedure. Four weeks later recovery was perfect, after the poor child had been aspirated, incised, and resected, first with saw and then with shears.

Case X.—In refererence to the case of the tubercular machinist mentioned above, I may state that on account of insufficient technique the exploratory needle, although repeated by one of the most prominent authorities of this city, yielded no pus. On account of this, the well-developed dullness was supposed to be due to an infiltration. Three days later, when I saw the case for the first time, I aspirated three times until I found pus.

A more striking illustration of the difficulty of the exploratory technique is the following case, which shows how grave an error I committed only a few months ago:

Case XI.—A. R——, 2 years of age, of a good family record, was sent to my office with a letter from Dr. Moskiviecz, stating that the child had suffered from pleuro-pneumonia, and that this was followed by empyema. Aspiration had yielded pus, and so he had referred the patient to me for operation.

The parents took the child first to another physician, a very well-known diagnostician in this city, and one who has had much experience with empyema. After several aspirations, in which he failed to find pus, he stated that no operation was required. The child not improving, it was brought to me. I made six aspirations, and then the parents objected to its further use, so I became somewhat perplexed and did not give any positive opinion about the case, although the symptoms of dullness, weakened respiration, and the history were in favor of empyema. The question of operation was, therefore, deferred for twenty-four hours. The next day pus was found and the operation performed. After resecting the rib I found a small cavity filled up with an immense cheesy mass, only about half a tablespoonful of pus being present in the cavity. The aspirating needle undoubtedly had been inserted into the mass repeatedly, and could naturally draw no pus.

Case XII.—L. I——, aged 12, had developed empyema after pleuritis. The exploratory needle yielded pus. On the following morning I had determined to operate on the child at St. Mark's Hospital, but during the night repeated attacks of cough, lasting several hours, brought on a considerable amount of expectoration.

In the morning I repeated the explorations a dozen times without finding pus, so that I, regarding this rapidly improved condition of the patient, restrained from operating. Shortly after perfect recovery took place. I assume that in the night, perhaps induced by the puncture, perforation into a bronchus had taken place.

Case XIII.—M. T——, a girl aged 8, with the same history, recovered after I had drawn pus. On the following day, before I wanted to operate, I could not find any more pus, even after I had aspirated a dozen times.

In this case no cough had been present. Perhaps there was a connection here between irritation by puncture and rapid absorption.

Case XIV.—M. L——, aged 6, strong boy, with good family record, took sick, after having swallowed a considerable amount of orange kernels. He located his

very sharp pains in the right iliac fossa, had vomiting and slight convulsions. The temperature was 106° F.; pulse, 144; respirations, 42. It was not at all unnatural that the house physician thought of appendicitis, much more so as one of the patient's comrades had, during play, taken gymnastic exercise by jumping on his abdomen.

One of our most prominent surgeons was called in at once, who, as he could not ascertain any resistance in the right iliac fossa, advised expectant treatment. The right leg of the patient could be lifted without causing any pain. At the same time I had a chance to examine the patient. I got the impression that a difference of sounds was obtained by percussing the right lower lobe. But as the nuance was only slight, and people as a rule do not have much confidence in the percussion of of a surgeon, we agreed to have a well-known specialist for lung diseases present, who, indeed, when he had examined the child on the following day, could now easily make the diagnosis of pleuro-pneumonia.

Three weeks later I performed resection for empyema. The patient improved rapidly until the house physician, three weeks later, tried to do without a drainage tube. The opening obliterated outside at once, but a few days afterwards chills set in. As no subjective symptoms, especially no pains, were present, typhoid fever was thought of by the attending physician, a diagnosis which was corroborated by one of the greatest clinical teachers of this country.

When I was called two days later I, by forcing a grooved director into the old scar, could easily demonstrate the presence of pus. It is superfluous to say that its evacuation cured the "typhoid" immediately. A drain was introduced again, and eighteen days later perfect recovery had taken place.

SECTION V.—MILITARY MEDICINE AND SURGERY.

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J. MILLS BROWNE, M. D., Chief of Bureau of Medicine and Surgery, U. S. Navy (retired).

WILLIAM A. HAMMOND, M. D., Surgeon-General, U. S. Army (retired).

ROBERT MURRAY, M. D., Surgeon-General, U. S. Army (retired).

JOHN MOORE, M. D., Surgeon-General, U. S. Army (retired).

J. RUFIUS TRYON, M. D., Surgeon-General, U. S. Navy.

Col. CHARLES PAGE, M. D., Assistant Surgeon-General, U. S. Army.

Col. FERNANDO LOPEZ, M. D., Mexican army.

Col. THOMAS CASAS, Medical subinspector of the first class, Spanish army, Havana.

Surg. Gen. ROBERT GRIEVE, M. D., Georgetown, B. G.

Surg. Gen. JOSEPH D. BRYANT, M. D., State of New York.

Surg. Gen. NICHOLAS SENN, M. D., Wisconsin National Guard.

Surg. Gen. WALTER WYMAN, M. D., U. S. Marine-Hospital Service.

Medical Director PHILIP S. WALES, M. D., U. S. Navy.

THOMAS A. MCPARLIN, M. D., brevet brigadier-general, U. S. Army (retired).

EDW. P. VOLLUM, M. D., colonel, U. S. Army (retired).

Col. JOSEPH R. SMITH, M. D., Assistant Surgeon-General, U. S. Army.

Medical Director ALBERT L. GIHON, M. D., U. S. Navy.

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HUNTER MCGUIRE, M. D., Richmond, Va., formerly surgeon, C. S. army.

ROBERT WEIR, M. D., New York, formerly assistant surgeon, U. S. Army.

P. S. CONNER, M. D., Cincinnati, formerly assistant surgeon, U. S. Army.

Surg. Gen. D. BERGIN, M. D., Canadian militia.

Surg. Maj. FREDERICK W. STRANGE, M. D., Canadian regiment of infantry.

Executive President.

Brig. Gen. GEORGE M. STERNBERG, Surgeon-General U. S. Army, Washington, D. C.

Secretaries.

Maj. JOHN VAN R. HOFF, M. D., surgeon, U. S. Army (English-speaking), Governor's Island, N. Y.

Passed Asst. Surg. D. M. GUITÉRAS, M. D., U. S. Navy (Spanish-speaking), U. S. Naval Hospital, Philadelphia.

Dr. MALLO (Piedad 1259), Buenos Ayres, Argentine Republic.

Dr. HERNANDEZ, La Paz, Bolivia.

Dr. CARLOS FREDERICO S. X. AZEVEDO, Rio de Janeiro, U. S. of Brazil.

Dr. ABRAHAM APARICIO (Carrera 8), Bogota, Republic of Colombia.

Dr. JUAN J. ULLOA, San José, Costa Rica.

Dr. EDUARDO SEMPRUN (San José 10), Havana, Cuba.

Dr. D. E. GUESDE, Point à Pitre, Guadaloupe, French West Indias.

Dr. JUAN J. ORTEGA, Guatemala City, Guatemala.

Dr. A. COMEAU, Port au Prince, Haiti.

Dr. G. P. ANDREWS, Honolulu, Hawaii.

Dr. JOSÉ GAYÓN (Hospital Militar), City of Mexico, Mexico.

Dr. J. MARTINEZ, Granada, Nicaragua.

Dr. GABRIEL HONORÉ (Gaboto 151), Montevideo, Uruguay.

Dr. N. GUARDIA, Caracas, Venezuela.

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Bvt. Lieut. Col. A. A. WOODHULL, M. D., surgeon, U. S. Army.
Surg. Gen. GEO. HENDERSON, M. D., National Guard District of Columbia.
Maj. ROBERT M. O'REILLY, M. D., surgeon, U. S. Army.
Maj. JOSEPH K. CORSON, M. D., surgeon, U. S. Army.
C. N. HOAGLAND, M. D., formerly surgeon, Ohio Volunteers.
BEDFORD BROWN, M. D., formerly surgeon, C. S. army.
H. C. GOODMAN, M. D., formerly surgeon, U. S. Volunteers.
MELANCTHON STORRS, M. D., formerly surgeon, Connecticut Volunteers.
O. D. BALL, M. D., pension examining surgeon, Albany, N. Y.
CAPT. H. O. PERLEY, M. D., assistant Surgeon, U. S. Army.

ORGANIZATION AND MINUTES.

With view to inviting the particular attention of physicians who are or have been military medical officers to this section, the following letter together with the section announcement, was sent to 5,000 medical officers in the U. S. Army and Navy of the U. S. Volunteers, of the Confederate States army, of the National Guard, and also of the Marine-Hospital Service. The labor involved in obtaining the addresses of this large number of physicians was very great, every effort was made to learn the names and residences of all living who had served or are serving as medical officers, and it is believed that, while some were unavoidably overlooked, a very large proportion were personally addressed:

MY DEAR DOCTOR: You are no doubt aware that a Pan-American Medical Congress is to be held in the city of Washington in September, 1893 (September 5, 6, 7, and 8.)

Among the sections which have been organized for this meeting is one upon military medicine and surgery.

It is the desire of the executive officers of this section to secure a full attendance of medical officers of the Army, the Navy, and the National Guard now on the active list, and also of retired medical officers of the different branches of the service and of medical officers of the Union or Confederate service who served during the late war.

It is believed that such a gathering will be both pleasant and profitable, as it will furnish an opportunity for the renewal of friendly relations among those whose experience in military medicine and surgery was gained during the war, and will enable the younger medical officers now on duty in the Army, the Navy, and the National Guard to make the acquaintance of these veterans and to profit by their experience, as it may be given in papers read before the section or in the discussion of these papers.

We hope also to have a large attendance of medical officers from the other countries which have been invited to take part in this Pan-American Congress, and to learn from these gentlemen the methods employed in their several countries in the treatment, transportation, etc., of sick and wounded soldiers and sailors, in whose interest the sessions of this section will be held.

We desire especially to have new methods of surgical treatment adapted to military practice, new appliances for the field or hospital, and improvements in means of transportation brought before the section for discussion, and, so far as possible, illustrated by an exhibition of the appliances referred to.

A general invitation is extended to those gentlemen who receive this letter to be

present at the meeting and to take part in the discussions of the section on military medicine and surgery.

Papers intended for this section should be typewritten and should be sent to the English-speaking secretary, if in English, or to the Spanish-speaking secretary, if in Spanish, at least ten days before the meeting. Those who will contribute papers are requested to send the titles to one of the secretaries of the section at as early a date as is practicable. Abstracts should be forwarded to the secretary-general not later than July 11.

Very respectfully,

GEO. M. STERNBERG, M. D.,
Surgeon-General U. S. Army,
Executive President Section Military Medicine and Surgery.

Permission was granted by the board of regents of the Smithsonian Institution to the section of military medicine and surgery to use the lecture room of the National Museum building for its meetings, and authority to pich the tents pertaining to the field hospital was conveyed in the following letter, viz:

OFFICE OF PUBLIC BUILDINGS AND GROUNDS,
WAR DEPARTMENT,
Washington, D. C., July 15, 1893.

GENERAL: In compliance with the request contained in your letter of the 14th instant as president of the section of the Pan-American Medical Congress to be held in this city in September, 1893, you are authorized to pitch tents in the grounds immediately west of the Army Medical Museum building for the purpose of demonstrating to the members the method of arranging a field hospital, and also to show the drill of the hospital corps

It is understood that the tents will not be used for encampment purposes in the ordinary acceptation of that term; that they will remain in position only three or four days, and that all débris will be removed and damages to lawn, if any, will be repaired at the expense of your Department.

Very respectfully, your obedient servant,

JOHN M. WILSON,
Colonel, U. S. Army.

Brig. Gen. GEORGE M. STERNBERG,
Surgeon-General, U. S. Army, Washington, D. C.

FIRST DAY'S PROCEEDINGS.

WASHINGTON, D. C., *September 5, 1893.*

In accordance with the programme on the afternoon of September 5, 1893, a considerable number of members of the Congress met informally at the Army Medical Museum, and inspected the valuable collections therein contained; they also visited the famous library of the Surgeon-General's Office.

SECOND DAY'S PROCEEDINGS.

WASHINGTON, D. C., *September 6, 1893.*

ADDRESS TO MEMBERS OF THE PAN-AMERICAN MEDICAL CONGRESS.

By Brig. Gen. GEORGE M. STERNBERG, Surgeon-General, U. S. Army,
Executive President of the Section on Military Medicine and Surgery.

GENTLEMEN: We are assembled for the purpose of discussing questions relating to military medicine and surgery; to consider what progress has been made in the treatment of camp diseases and of gunshot wounds as a result of recent discoveries relating to the etiology of infectious diseases and of traumatic infections; to profit

by the experience of those who have had experience in the care of wounded men upon the field of battle and of the sick of armies engaged in actual warfare; to deliberate as to the best methods of transporting the wounded from the firing line and of rendering them the immediate assistance which may be required to save life; to compare the injuries inflicted by firearms now in use with those which came under our observation when a larger bullet with a much less initial velocity was the missile which caused a majority of the wounds we were called upon to treat.

All of these questions are interesting to us as military surgeons and of vast importance so far as the victims of future wars are concerned. It is true that peace prevails everywhere in the New World; that a most friendly feeling exists among the republics of North and South America; and that the modern way of settling disputes between nations is by arbitration rather than by a resort to arms. But so long as armies exist and deadly weapons are manufactured it will be the duty of the military surgeon to be prepared to render efficient aid to those who fall in battle, and to give the victims of those "camp diseases" which sap the strength of armies the benefit of the most efficacious treatment.

A still more important part of the duty of the medical officer in garrison or in the field consists in the sanitary supervision of the command with which he is serving; for, without doubt, most of the sickness which prevails among soldiers, and especially among new levies of troops, is due to insanitary conditions, and is preventable to a greater or less extent according to circumstances. But the subject of military hygiene does not properly come within the province of this section, and we simply refer to its importance *en passant.*

We are, however, especially interested in the subject of the transportation of wounded men from the field of battle. And in future wars we will have to meet new conditions, arising from the use of weapons having an extremely long range and from the nature of the wounds inflicted by bullets of small caliber projected with enormous velocity. Men will be disabled in great numbers within very brief periods of time, and of those struck by these missiles a large portion will require to be promptly removed from the field of action, for a smaller proportion will be killed outright.

Under these circumstances it is evident that our organization for the purpose of rendering first aid to the wounded and transporting them to the field hospitals must be carefully considered, and that the most efficient service will require a corps of assistants especially trained for this duty.

This matter has already received the careful attention of medical officers in the U. S. Army, and we have now an organization designed to perform these duties, with the assistance of "company bearers" who also receive special training with reference to first aid, litter drill, etc. In time of peace our enlisted men of the "Hospital Corps" perform the duties of nurses, cooks, and attendants in post hospitals, and they are regularly drilled in the most approved methods of handling wounded men and removing them from the field of battle.

A manual of drill for the Hospital Corps has been prepared by a board of medical officers and approved by the Secretary of War. It will shortly be published "for the information and government of the Army and for the observance of the militia of the United States." A demonstration of the litter and ambulance drills, as directed by this manual, will be made by Maj. Hoff, of the Medical Department of the Army, English-speaking secretary of this section, who was one of the medical officers to whom the duty of preparing the manual was intrusted. After this demonstration I hope we may have a free discussion of the merits of the system, as compared with the older, haphazard way of caring for wounded men which prevailed during our civil war. There are many present whose experience upon the field of battle will enable them to judge of the advantages which are likely to result from system and previous training in handling wounded men, and also as to the practicability of carrying out, upon the firing line, the methods which have been adopted.

The results obtained by our military surgeons during the late war are summarized in the following table, which has been prepared, at my request, by Maj. Charles Smart, surgeon, U. S. Army from the data on file in the Surgeon-General's office. The table also shows the number of amputations and excisions made by medical officers of the Army since the war and the percentage of mortality from the same. It will be seen that the mortality rate has been considerably reduced. This is, no doubt, partly due to improved methods of treatment, and especially to antiseptic surgery, although a considerable proportion of the operations made since the war were made before the general adoption of antiseptic methods, or under circumstances which did not admit of the application of these methods:

Number of amputations and excisions of the extremities during the war of the rebellion and the period 1866–'91, with percentages of mortality.

	During the war.		Since the war.	
	Number of cases.	Percentage of mortality.	Number of cases.	Percentage of mortality.
UPPER EXTREMITY.				
Amputations:				
Shoulder	852	28.5	7	14.3
Arm	5,456	23.6	62	19.4
Elbow	36	8.4	1	.....
Forearm	1,747	13.9	57	8.8
Wrist	68	10.6	10	.....
Fingers, with or without metacarpals	7,842	2.6	830	1
Total	*16,001	.....	967	.....
Excisions:				
Clavicle or scapula	80	2.7	1	.....
Shoulder	885	34.8	5	20.0
Humerus	696	28.5	11	.....
Elbow	626	23.7	5	20.0
Bones of forearm	986	11.2	7	.....
Wrist	96	15.6	1	.....
In hand	116	8.6	22	4.5
Total	3,485	.....	52	.....
LOWER EXTREMITY.				
Amputations:				
Hip	66	83.3	4	75.0
Thigh	6,229	53.8	63	41.3
Knee	189	56.6	7	.....
Leg	5,452	32.9	87	20.7
Ankle	161	25.1	21	9.5
Partial, of foot	1,518	5.7	182	.....
Total	*13,615	.....	364	.....
Excisions:				
Hip	66	88.6	6	33.3
Femur	175	69.4	3	33.3
Knee	57	81.4	.....	.....
Bones of leg	387	28.2	6	16.7
Ankle	33	29.0	3	.....
Bones of foot	97	19.3	6	.....
Total	815	.....	24	.....

* In addition to the amputations reported above as performed for gunshot fracture during the war, there were 583 amputations of parts of the lower extremity, with a mortality 25.5 per cent, and 195 of the upper, with 10 per cent mortality on account of extensive flesh wounds, in which the fatality was due mainly to shock.

For the purpose of showing the enormous responsibility of the medical department of an army in time of war the following figures are given, showing the total number of cases treated in the armies of the United States during the late war, as given in the Medical and Surgical History of the War of the Rebellion. The figures relate to white troops only, and are for the period from May 1, 1861, to June 30, 1866.

The total number of cases recorded in reports of sick and wounded was 5,825,480, with a total mortality of 166,623. The total number of gunshot wounds was 230,018,

with a mortality of 32,907. (The total number killed in battle was 42,724.) The total number of deaths from disease was 157,004, the principal causes of mortality being: Typhoid fever, 27,056+typho-malarial fever, 4,059=31,115; chronic diarrhœa, 27,558; inflammation of lungs, 14,738; consumption, 5,286; smallpox, 4,717; measles, 4,246; acute dysentery, 4,084; chronic dysentery, 3,229; remittent fever, 3,853. No doubt many of the deaths attributed to "remittent fever" were in fact due to typhoid infection, which in this war, as in many of those which preceded it, proved to be nearly as fatal to the troops engaged as the bullets of the enemy.

No question is more important for the medical officer than that which relates to the prevention of typhoid fever and the various forms of intestinal flux, which in the past have caused such enormous losses to armies engaged in active field operations. No doubt a very large proportion of the sickness from these causes could be prevented by the simple prescription—boil all water used for drinking purposes which does not come from a source that is unquestionably pure.

But the question of the prevention of these camp diseases so destructive to armies, and especially to new levies of troops in warm climates, belongs to the section on military hygiene, and I must restrict myself to topics which come strictly within the province of military medicine and surgery.

I therefore ask your attention for a short time to a subject which has been of great interest to military surgeons in the past, but which, in the light of our present knowledge, should be interesting to us rather from a historical than from a therapeutic point of view. I refer to the question of traumatic infections. Hospital gangrene, erysipelas, septicemia and tetanus have no longer the terror for us that they had for our predecessors, for the etiology of these traumatic infectious diseases has been elucidated by researches made during the past fifteen years and, knowing the cause, the proper measures of prevention are apparent and are systematically applied whenever this is practicable.

That the infectious diseases mentioned result from the introduction into wounds of pathogenic bacteria is now definitely settled, and in the case of erysipelas and tetanus we know the specific characters of the parasitic invader which gives rise to these forms of wound infection. But no such demonstration has been made as regards hospital gangrene, probably because bacteriologists have had no opportunities for investigating this disease since the introduction of Koch's admirable methods of research. The writer, while in charge of the surgical wards of a large general hospital at Portsmouth Grove, R. I., in 1862, witnessed a typical epidemic of this disease which served as a lesson never to be forgotten. The two wards devoted to the treatment of surgical cases were filled with wounded men from the Army of the Potomac. A considerable proportion of the cases were simple flesh wounds, progressing favorably to a cure by granulation and cicatrization. Others were of a more serious character and were attended with profuse suppuration. The hospital was favorably located on Narragansett Bay, supplies of all kinds were abundant, nurses were in sufficient number and attentive, but the medical officer in charge was young and inexperienced. Under his direction the wounds were systematically cleansed and dressed with absorbent lint, etc. Nature seemed to be fully equal to the work of repair, except in those cases where a mistaken conservatism at the field hospital had left compound fractures to her unaided efforts. In such cases profuse suppuration and septic toxemia sapped the strength of strong men. Possibly it was in such a case that the mischief commenced. Doubtless it was from one or more initial cases that the infection was carried by the sponges of willing but ignorant attendants to a considerable number of wounds which up to this time were progressing rapidly towards cicatrization. The result was a conflagration. Wounds previously healthy became inflamed, painful and angry looking, and within two or three days the cause of this change was apparent. The area of inflammation involving the previously healthy tissues rapidly extended and sloughs formed, sometimes as large as a man's hand and extending deeply among the muscles and along the planes of

cellular tissue. Fortunately, the infectious nature of the malady was quickly recognized and the measures adopted arrested its progress. It is hardly necessary to say that these measures included the removal of those not yet infected from the overcrowded surgical wards, a general cleaning up, whitewashing of walls, etc., and the necessary precautions relating to the conveyance of infection by sponges, etc. The treatment of the gangrenous wounds consisted in deep cauterization by means of nitric acid applied with a swab, the removal of necrosed tissue as soon as practicable, and the application of charcoal poultices. Goldsmith's bromin treatment had not yet been suggested. Under the treatment adopted the local extension of the disease was promptly arrested, and as soon as the sloughs had separated healthy granulations sprang up and in time repaired the mischief which had so quickly occurred.

This brief account of an epidemic of hospital gangrene witnessed by myself is intended to serve as an introduction to some remarks upon the history and etiology of this affection.

It is altogether probable that it was known to Celsus, who had described a condition of wounds not properly treated, which appears to be identical with the affection known to us as hospital gangrene. Ætius, who wrote in the fifth century, refers briefly to a similar affection. Some of the ancient authors appear to have described the form of wound infection under consideration by the name of "carbuncle." Rolandus, who wrote in the twelfth century, had a chapter in his third book on wounds, entitled "De Carbunculo supervenienti vulneri." Alphonsus Terrus, who, in 1534, published one of the first treatises upon gunshot wounds, was of the opinion that all wounds of this class were poisoned by the gunpowder. He gives an account of the results of such supposed poisoning, which makes it appear probable that he encountered hospital gangrene. He recommended the actual cautery as a cure for this condition, and also as a preventive. Ambrose Paré combated the idea that gunshot wounds were poisoned by gunpowder or burned by the ball, and attributed the unhealthy condition into which such wounds were sometimes observed to fall to a "corrupted state of the atmosphere." He remarks that, owing to this cause, "Nous en sommes devenus sages par l'expèrience de tant de plaies, lesquelles lors que je m' éfforcais à les guérir, rendoient une telle et si grande puanteur, indice et temoinage tres certain de pourriture et infection, que les assistans ne la pouvoient sentir qu' a conter cœur, et avec bien grande difficulté."

Paré's treatment of hospital gangrene consisted in the application of an ointment containing pulverized alum, verdigris, and sulphate of copper. It does not appear to have been very successful, as he reports that in many of the wounded in the battle of St. Denis the wounds fell into putrefaction and were accompanied by putrid fever and other serious accidents, and nearly all the wounded died, although their wounds may have been slight and they were supplied with everything necessary for their proper sustenance and treatment. According to Paré the wounds made by swords, pikes, and lances became affected with gangrene (les pourritures) as well as those made by firearms.

La Motte, who wrote his Complete Treatise on Surgery early in the seventeenth century, gives a very complete account of hospital gangrene. He says:

On prend ce mot (gangrène), properment pour un disposition a la mortification qui est ce qu'on appelle vulgairement pourriture a l'Hotel Dieu de Paris, laquelle survient et accompagne presque toutes les playes qui sont traités dans cet hôpital, et la plus grande partie des absces que l'on y ouvre, a cause de l'air corrompu qui y regene et que ces blessez y respirent.

The practice of surgery in a hospital where the opening of an abscess was likely to be followed by rapidly spreading gangrene must have been rather discouraging, and so long as the idea prevailed that this resulted from "a corrupted condition of the air," rather than from direct infection conveyed from wound to wound by instruments, sponges, etc., there was little chance of eradicating the evil.

Ponteau, who wrote in 1783, referring to the prevalence of gangrene in French hospitals, raises the question whether such institutions are not, on the whole, more

pernicious than useful to mankind. What would these surgeons of two hundred years ago have thought of our laparotomies for removal of the appendix, etc.; of our operations on the principal joints; and of the absence of "surgical fever" after serious operations made antiseptically or with aseptic precautions?

Mr. John Bell, in his Principles of Surgery, published in 1799, says:

There is no hospital, however airy or well regulated, where this epidemic ulcer is not found at times. (p. 112). He must indeed be ignorant who disputes this hospital sore being a general disease of the system; he must have observed very little who does not know it to be absolutely an infection. (p. 117). Is the surgeon to seek for washings and dressings, use ointments and plasters, and expend butts of wine to cure such a disease? No; let him bear this in mind, that no dressings have ever been found to stop this ulcer; but, on the other hand, that out of the circle of the hospital the patients are safe; carry them anywhere, and at any expense, even to a stable or a dunghill. (p. 118).

No doubt this was good advice in the absence of any exact knowledge as to methods of disinfection, for even if the infectious material was destroyed in the wounds by the actual cautery, or by applications of fuming nitric acid, there was always danger of reinfection so long as the patient remained in the infected hospital wards.

The total number of cases of gangrene reported during our civil war, as occurring among the wounded of the Union armies, was 2,642. Of these, 4 cases occurred in 1861; 223 in 1862; 623 in 1863; 1,611 in 1864, and 135 in 1865; 1,361 cases terminated in recovery, and 1,142 were fatal, but in a considerable number of the fatal cases death was due to the original injury or to other complications—septicemia, hemorrhage, etc.

For details with reference to the principal epidemics of hospital gangrene during the war I must refer to the interesting reports of Acting Assistant Surg. W. W. Keene, U. S. Army; Surg. J. H. Brinton, U. S. Volunteers; Surg. M. Goldsmith, U. S. Volunteers; Assistant Surg. William Thomson, U. S. Army, and others, ext acts from which will be found in the third surgical volume of the Medical and Surgical History of the War.

The facts detailed in these reports correspond with those previously observed in various parts of the world, and show that hospital gangrene is a local disease due usually to the infection of wounds from previous cases.

This brings us to the question as to the origin of the primary cases in an epidemic—a question which is of special interest, not only as regards this disease, but in its bearing upon the etiology of other local infectious processes.

Do epidemics originate *de novo* as a result of an increased pathogenic power on the part of some common putrefactive microörganism, or is there a specific "germ" of hospital gangrene? The former supposition appears to me to be more in consonance with the facts relating to the origin of epidemics, and is sustained by extended experimental researches which show that the pathogenic potency of many bacteria is greatly intensified by cultivation in albuminous fluids and under favorable conditions. This is true of the pus cocci, which may thrive upon the surface of the body of healthy persons or upon mucous surfaces as harmless parasites; but which under favorable conditions may invade the tissues, producing acute abscesses, erysipelatous inflammations or gangrenous sloughs, according to the pathogenic potency of the micrococcus and the degree of vital resisting power on the part of the tissues. The streptococcus pyogenes from a malignant case of erysipelas or from the abdominal cavity of an individual who has succumbed to puerperal peritonitis may give rise, when introduced beneath the skin of a healthy person, to the most violent local inflammation and to general septicemia. But if cultivated for a length of time in unfavorable artificial media its pathogenic potency may be so reduced that it gives rise to a local abscess only.

The same has been demonstrated, by experiments upon the lower animals, to be true as regards certain bacteria found in putrefying material. Some of these when injected beneath the skin of a mouse, a rabbit, or a guinea pig, give rise to a rap-

idly fatal septicemia; others cause an extensive inflammatory edema in the vicinity of the point of inoculation; still others to a progressive gangrene. By inoculating from animal to animal, the virulence of the pathogenic microörganism inducing these morbid phenomena is increased, so that the smallest fraction of a drop of blood, or of bloody serum from the subcutaneous tissues of an animal recently dead from such an inoculation, suffices to kill another animal of the same species within a brief period. But there is another element which influences the result when virulent putrefactive material is introduced beneath the skin of an animal for experimental purposes, or into an open wound by accident, i. e., the vital resisting power of the tissues. The body of a dead animal under favorable conditions of temperature is quickly invaded by putrefactive bacteria. But in the living animal such invasion is successfully resisted in many cases, even when putrefactive bacteria are brought in contact with open wounds. This is especially true as regards carnivorous animals, while the herbivora are especially susceptible to local or general infection when putrefactive material is brought in contact with an open wound. There is also a difference in individual susceptibility in animals of the same race. As a rule, young animals are more susceptible than adults, and susceptibility to infection is increased by depressing influences, such as insufficient food, excessive exertion, bad air from overcrowding, or putrid emanations, etc.

It is under such depressing influences that epidemics of hospital gangrene have commonly had their origin. That the disease may originate independently of pre-existing cases seems to be well established by the history of independent outbreaks in distant parts of the country during the war, in new hospitals, and among wounded men brought directly from the field of battle.

Billroth, in his surgical letters from the war hospitals in Weissenburg and Mannheim (1870), says:

While I was at Mannheim but a single case of hospital gangrene occurred. This was in Barrack J of the hospital which had been placed under my direction. The medical officer of the day did not recognize the disease and first called my attention to it on the third day. Fortunately no other cases had become infected. I cauterized the wound (a gunshot fracture of the upper arm) with fuming nitric acid, and after separation of the slough it was again healthy. In Darmstadt, in the great barrack hospital, two or three cases occurred, which were treated the same way and isolated. So far as I am informed this was the end of the trouble.

In discussing the origin of these cases Billroth says:

Where did the contagion come from for the one case in Mannheim and for the cases in Darmstadt? That I really can not say, but I suspect that the infectious material was attached to lint which had been made from hospital linen, or had been scraped in a hospital in which hospital gangrene existed. This suspicion may appear very singular to many physicians, but will serve to show how thoroughly I am convinced of the specific origin of hospital gangrene.

To the writer it appears far more probable that these were cases of the *de novo* origin of gangrene as a result of the introduction into a suppurating wound of saprophytic bacteria which, owing to favoring conditions in the wound itself or to slight resisting power on the part of the tissues, had acquired sufficient pathogenic virulence to enable them to invade living tissues. It may be that there is some particular saprophyte, which is widely distributed, to which this result is commonly due; or it may be that there are a number of putrefactive bacteria which under favorable conditions may acquire this power of invading living tissues. The result is probably due, to some extent, to the development of toxic ptomaines in the secretions of the wound by putrefactive bacteria present in these secretions, which, being absorbed, lower the vital resisting power of the tissues. Deep and profusely suppurating wounds, and especially gunshot fractures of the larger bones, in which pockets and sinuses occur from which it is difficult completely to remove accumulations of pus, furnish the conditions most favorable for the development of such pathogenic virulence as may suffice to make a saprophytic bacillus a facultative parasite.

The greater liability to the development of hospital gangrene in wounds complicated by fracture of bones is shown by the following table, which is taken from the Medical and Surgical History of the War. (Third Surgical Volume, p. 824.)

Summary of 2,642 cases of gangrene, indicating the result and relative frequency.

Seat of injury.	Recovery.	Fatal.	Undetermined.	Total.	Per cent of fatality.	Per cent of relative frequency.
Flesh wounds of head, face, and neck	5	7	.....	12	58.3	60=2.2%.
Fractures and penetrating wounds of head, face, and neck	32	16	.....	48	33.3	
Flesh wounds of trunk	36	32	7	75	47.0	216=8.2%.
Fractures and penetrating wounds of trunk	44	97	.....	141	68.7	
Flesh wounds of the upper extremities	47	50	12	109	51.5	2,3668=9.6%.
Fractures of the upper extremities	476	245	14	735	33.9	
Flesh wounds of the lower extremities	125	127	92	344	50.3	
Fractures of the lower extremities	596	568	14	1,178	48.7	
Aggregates	1,361	1,142	139	2,642	45.6	

It is a remarkable fact that while the larger number of cases occurred in wounds attended with fracture, the greatest mortality resulted in simple flesh wounds.

From our point of view the etiology of hospital gangrene does not differ materially from that of traumatic erysipelas so far as general conditions are concerned, but the two diseases are doubtless due to different microörganisms. That which is the usual cause of erysipelas is now well known to bacteriologists under the name of streptococcus pyogenes, or streptococcus erysipelatous.

Whether hospital gangrene is a specific infection in the same sense that erysipelas is, i. e., an infection due to a specific microörganism, has not been determined, but it seems probable that such is the case. It does not follow from this, however, that all cases of these traumatic infectious diseases originate by direct or indirect transfer of the infectious agent from previous cases. Erysipelas does not necessarily result from the introduction of streptococcus pyogenes into an open wound. This streptococcus is frequently found in the pus of acute abscesses unattended with any erysipelatous inflammation. But under favorable conditions it may develop virulent properties, which are manifested especially by a tendency to invade the tissues by way of the lymph channels and along cellular planes, producing a dilation of the capillary vessels and more or less serous effusion, leading often to suppuration and sometimes to necrosis of the invaded tissues. The development of first cases of either disease probably depends upon predisposing causes relating to the individual or his environment.

A traumatism is more likely to be followed by erysipelas in a man whose vitality is below par on account of intemperance, insufficient food, bad hygienic surroundings, etc., and the same is true as regards hospital gangrene. Under such conditions the comparatively harmless streptococcus pyogenes may overcome the barriers established by nature to resist invasion by saprophytic bacteria, and having acquired the power to multiply as a parasite in tissues enfeebled by the causes mentioned it soon attains a pathogenic virulence which enables it to invade healthy tissues when transferred by accidental inoculation to another individual.

The view here advanced with reference to the *de novo* origin of erysipelas is supported by the fact that solitary cases frequently occur at remote military posts. Thus during the past year 28 cases are reported as having occurred among the enlisted men of the U. S. Army. Of these 18 occurred at 18 different posts, while 3 posts had 2 cases each and 1 post had 4.

The facts relating to the etiology of pneumonia correspond with those referred to as relating to that of erysipelas. In this disease, also, the specific cause has been shown to be a micrococcus (*Micrococcus pneumoniæ crouposæ*) which is frequently found in the salivary secretions of healthy persons, and which varies greatly as to its patho-

genic virulence. Solitary cases of the disease occur at our military posts, as elsewhere, as a result, no doubt, of predisposing and exciting causes which give the specific cause the mastery over the resources provided by nature for resisting the local infection which constitutes the disease in question.

The total number of cases of traumatic erysipelas reported as occurring in the armies of the United States during the war was 1,097, with a mortality of 41 per cent.

The micrococcus which is now recognized as the usual cause of erysipelatous inflammations is capable of growing either in the presence or absence of oxygen; i. e., it is an aërobic and facultative anaërobic microörganism. We infer that the same is true as regards the microörganism which produces hospital gangrene. But in the case of tetanus, which has been proved by recent researches to be an infectious malady due to a bacillus widely distributed in the superficial layers of the soil, it has been shown that this bacillus is a strict anaërobic. It does not grow in the presence of oxygen and could not thrive in superficial wounds. This probably accounts for the fact that epidemics of tetanus are not common. The cases which occur are for the most part sporadic cases, due in each instance to infection, resulting from the introduction of surface soil or dust containing the tetanus bacillus. Such material in an open wound might be innocuous. But introduced into the depths of a gunshot wound, into a closed amputation wound, or into a punctured wound made by a rusty nail, for example, the tetanus bacilli (spores) present find the conditions favorable for development and this fatal infectious malady results.

Sporadic cases of hospital gangrene probably occur in a similar way, but as there is a free escape of virulent material from the infected wound, the danger of the disease being transmitted to other wounded individuals is infinitely greater.

The total number of cases of tetanus reported in the Medical and Surgical History of the War is 505, or a little more than 2 per 1,000 of the total number of injuries by weapons of war. More than one-fourth of the cases followed operations upon the extremities; 116 after amputations and 15 after excisions. We can scarcely doubt that a majority, at least, of these cases would have been prevented by modern methods of treatment—antiseptic or aseptic.

The same statement applies to the considerable number of cases reported under the heading pyemia. It seems probable that of the 2,818 cases reported under this heading a large proportion were in fact cases of septicemia resulting from wound infection. The very great mortality, and the results of post mortem examinations made, indicate this; but as it was before the days of bacteriological research there is no direct evidence on record showing the presence of bacteria in the blood and in the metastatic abscesses found in the lungs, the liver, the kidneys, spleen or joints in those cases in which an autopsy was made. Doubtless septic toxemia occurred in numerous cases but, as stated, we infer that a majority of the cases reported under the heading pyemia were in fact cases of septicemia resulting from infection through the wound by the pathogenic micrococci which are commonly concerned in this form of "blood poisoning," and especially by staphylococcus aureus. The mortality in the class of cases under consideration exceeded 97 per cent. Out of the total number of deaths (2,747) but 21 are reported to have resulted from other complications, viz, hemorrhage 7, gangrene 6, tetanus 2, erysipelas 1, peritonitis 1, and typhoid pneumonia 4.

One of the questions to be settled by the military surgeon in the next great war, which we earnestly hope will not occur on this continent, is to what extent the large mortality which has heretofore occurred from traumatic infections can be prevented by antiseptic methods of treatment. Certainly there will be no excuse for the occurrence of septicemia after amputations, or for the appearance of erysipelas or hospital gangrene in wounds made by the knife of the surgeon. But how far it may be practicable to prevent such complications in gunshot fractures remains to be seen, and the proper treatment of such injuries is an important point for consideration. If such cases could at once receive skillful surgical treatment, including the

removal of splinters, foreign substances carried into the wound by the bullet, and antiseptic dressings, no doubt many would be saved without loss of life or limb. But the changing fortunes of the battle field often make it impossible for medical officers to give such prompt attention to the wounded. It is generally conceded that on the firing line nothing more should be attempted than the arrest of hemorrhage, and such support to the fractured limb as will enable the wounded man to bear transportation to the field hospital with the least possible suffering. It is here that the fate of the unfortunate victim of war will often be decided, and the responsibility resting upon the military surgeon under such circumstances can not be overestimated. His decision with reference to operative interference must be prompt, and will often be governed by circumstances other than those laid down in surgical text-books. How far must the man be transported before he will reach a resting place at a permanent hospital? What are the means of transportation? Is he to be left at the mercy of the enemy as a prisoner of war? Shall his case be passed by because of others more urgently requiring attention? Many a leg must be sacrificed which might be saved under more favorable conditions, and conservative surgery must often yield before the inexorable contingencies of the battle field.

In future wars the question will be decided as to the propriety of performing laparotomy at the field hospital in penetrating wounds of the abdomen, for the purpose of exploration and suturing the intestine if it is found to be wounded. This is so important a question that I have attempted to make it the most prominent surgical topic for discussion at the present meeting, and trust that as a result of this discussion we may arrive at definite conclusions as to what our action should be if called upon to treat such cases.

What has been said will suffice to indicate to the young medical officer that much is expected of him; and that in view of recent additions to our knowledge relating to the etiology of the more common camp diseases, and of traumatic infections, and to our resources for preventing and curing such diseases, we have a right to expect a great reduction in the mortality from sickness and wounds in the armies engaged in future wars.

PAPERS READ BEFORE THE SECTION.

Surg. Gen. Charles Sutherland, U. S. Army (retired), then presented the following paper:

THE ORGANIZATION OF THE HOSPITAL CORPS.

I will take only a few moments of your time in describing the origin as well as the formation of the Hospital Corps of our Army.

In the past, in our Army, as well as in other armies, dependence was placed upon irregular attendance for the care of the sick and wounded. These services were frequently so imperfect in character as to render them at times valueless, if not harmful. This unsatisfactory state of affairs no longer continues; and following the example set us by the principal European nations, which organized hospital corps for their respective armies, and that we might be benefited by this valuable addition to our own service, Congress, in March, 1887, authorized the establishment of the Hospital Corps in our Army. This act sanctioned the organization of a corps consisting of hospital stewards, acting hospital stewards, and privates, all regularly enlisted by the Surgeon-General of the Army, permanently attached to the medical department, and charged with the performance of all necessary hospital services in garrison, camp, or field. The strength of the corps, now about 700 in number, is made discretionary with the Secretary of War, but the qualifications of

the personnel are prescribed by law. The pay and status of the stewards were raised to a much higher plane, corresponding with the higher grade of service officially required of them. Many of our stewards were capable of rendering this higher service, but to assure that this ability shall not be wanting, the law now requires that a searching examination be made into the qualifications of every member before his promotion. The duties of the privates were defined as those of wardmasters, nurses, cooks, and attendants in hospitals, litter-bearers and ambulance-drivers in the field, and any other duties as might by proper authority be required of them. The corps is raised by transfers from the line, and by enlistments from civil life as well, of such men as have a desire to enter this special service, and who are carefully selected on account of their fitness, intelligence, sobriety, and general aptitude. Promotion is always open to the capable and diligent who desire to secure an honorable position in the non-commissioned staff of the Army with its increased compensation.

In addition to this corps, the position of company-bearer was instituted, and 4 men of good character and fair intelligence from each company throughout the Army are selected from time to time, changing when required, to practice litter drill and first aid. Transfers are constantly occurring, and there is no difficulty in obtaining good men for the corps. Many intelligent and able young men, ambitious of promotion, have joined its ranks, and the record of their examinations would prove a surprise to many who are familiar with the work of the examiners at medical colleges and boards of registration. As an example of many who have presented themselves for examination for promotion, the following record may serve, viz: The percentages show of some 17 hospital stewards, 4 ranged from 92 to 95; 4, 89, and 9, from 80 to 85. Of 40 acting hospital stewards, 1 was 99; 2, 97; 2, 96; 11, 90 to 95; 14, 80 to 89; 9, 75 to 79, and only 1 just above the limit of 70 per cent.

The pay, which at first was only that of their comrades of the line, was found to be inadequate for the duty exacted, and for a time was a drawback to the strength as well as efficiency of the corps. This was happily changed by Congress in July, 1892, increasing the pay of the privates from $13 to $18 per month. This has given new energy to the corps and a future of greater excellence lies before it.

Three years after its creation the new corps was tested in active service in the field in the Sioux campaign, and demonstrated its value as an organization for the care of the wounded. On the battle field at the action of Wounded Knee 2 of its members rescued a wounded officer from extreme peril, which fully entitled them to the certificate of merit which they received as their reward, while the services that the remainder rendered were so orderly and well regulated, that not only our own wounded men, but wounded Indians, were with great promptness and dispatch removed and cared for in the field hospitals which were extemporized for their benefit.

Being impressed with the importance of thoroughly instructing the members of the corps in all their duties, by approval of the commanding general of the Army, I established 2 schools or companies of instruction and training at military posts west of the Missouri River, selecting 2 of the largest, viz, Fort Riley, Kans., and Fort Russell, near Cheyenne, Wyo. Their personnel consists of 3 medical officers, or more, for instruction; 7 noncommissioned officers from the stewards and acting stewards; 1 bugler; 1 artificer; 1 tailor, and 40 or more privates. The object of these schools is twofold; first, always to have at hand, for any emergency, a trained body of sanitary soldiers accustomed to working together; and second, to build up a training school through which all enlisted men of the Hospital Corps should pass. The course of instruction at these schools is by recitations, lectures, and demonstrations, and is both theoretical and practical, combining at once the training common to all enlisted men with the special instruction of the sanitary soldier. The curriculum is sufficiently comprehensive to give the men a fair knowledge of the requirements of their position, and comprises infantry drill and riding, the chief end of which in this connection is discipline; elementary lessons in human anatomy and

physiology; nursing; rudiments of materia medica and pharmacy (including poisons); surgical instruments, dressings, and preparations for operations, accidents, and emergencies, and in resuscitating the apparently drowned; first aid, bandaging, bearer drill; fieldwork, including the pitching and striking of tents, formation of dressing stations, field cookery, use of field equipments, practical application of first aid in the field, the use of wheel and pack transportation, care of horses, driving, etc.

In connection with the theoretical instruction, the men are in turn detailed for special instruction in the various departments of the hospital. The company and hospital kitchen constitute a school of practical cookery, in which men who have an aptitude in that direction are taught the management of the ration and other food supplies and its preparation for the table and the sick. After a course covering about six months, those sufficiently proficient are assigned to duty with the several detachments serving throughout the Army, where their practical education will be of the greatest value. In originating the first school at Fort Riley, the plan for its organization was carefully studied and digested. It was largely experimental, nothing of the kind having ever before been attempted in our Army. That it has been a great success I need scarcely tell you. To the energy and ability of its accomplished instructor, Maj. John Van R. Hoff, of the medical department, is due that excellence and high standing.

In conclusion, I will add that first aid and litter drill are being rapidly adopted by the National Guard of this country, and many of the State guards have arrived at a high point of excellence in this respect.

First aid is now taught also to the police in some of the larger cities, and the time is not far distant when ambulance and first-aid corps will become permanent parts of municipal administration, it being just as important to aid the sick and injured in time of peace as to succor the sick and wounded in time of war.

REMARKS OF DR. BERGEN, SURGEON-GENERAL OF THE CANADA MILITIA.

Mr. President and Gentlemen: It would afford me great pleasure indeed to address you on this occasion if I had been prepared for anything of the kind. I need scarcely say to you that I have listened with very great attention and with very great pleasure to the learned exposition upon hospital gangrene which our president has made this morning. I listened also with very great pleasure to Gen. Sutherland, and I quite agree with him that the time is not far distant when municipalities will be obliged, in deference to public opinion, to establish first aid and stretcher drills everywhere; because, as the general has very aptly said, we must have regard for the injured and the wounded in time of peace as well as in time of war.

In the country from which I come (Canada) we have made some little progress in the way of teaching the volunteer militia, which is the only army we have, not only first aid and stretcher drill, but a great deal of what is necessary to be known in connection with laparotomy. Some of our regiments of Canada militia have made astonishing progress in this way and are almost as perfect as it is possible for volunteer regiments to be.

From what I can learn I think that at 2 o'clock to-day we will all obtain a lesson such as it will not be our good fortune perhaps to receive again for many a day. I refer to the drill of the Field Hospital Corps by Maj. Hoff. From what I know and have heard since I came here, I feel that we will have such an exposition this afternoon as will confirm the belief entertained, that perfection has almost been attained by the U. S. Army Hospital Corps.

I shall not detain you longer, gentlemen, because it would be an abuse of your patience, and would be occupying time which can be better improved by others.

At the close of these remarks the executive president said: I had hoped that as the meeting of the session this morning Dr. Hunter McGuire, of Richmond, who is

one of our honorary vice-presidents, would be present to read a paper. But in his absence I would like, if he is so inclined, to hear from Dr. Bedford Brown, of Alexandria, Va., as a representative of the confederate service and who had great experience during the war of secession.

REMARKS BY DR. BEDFORD BROWN, OF ALEXANDRIA, VA.

MR. PRESIDENT AND GENTLEMEN: It was my fortune to be a surgeon in the Confederate army for nearly four years. During that period my services were confined entirely to the field, and all practice that I saw or had was field practice. I saw little or nothing of hospital practice, and what I am going to say will be confined entirely to the first mentioned.

In the beginning, I will state that probably no army of equal size and of equal intelligence and strength with the Confederate army had so few surgical appliances or medical remedies as it had. I will relate here a little incident to illustrate this:

In the campaign in northwest Virginia in 1861, through which I passed, on one occasion in an army containing about 17,000 men we had 4,000 cases of sickness. Gen. Lee was in command, and being destitute of almost everything, I approached him on one occasion and stated to him the facts in regard to our destitution, and in regard to nourishment and medicines. I do not believe that there were half a dozen ounces of quinine in that poor army. We had hundreds of cases of typhoid fever, diarrhea, dysentery, pneumonia, and bronchitis. I asked him what we were to do under the circumstances. We were cut off and confronted by a large army under command of Gen. Rosecrans. He said: "Doctor, I sympathize with you and these suffering men; but you must make something out of nothing; that is all I can say to you." And that was the prevailing rule at nearly all times. We had to "make something out of nothing."

The address of our President has impressed me most favorably, especially that portion in regard to hospital gangrene. While I did not see what was called hospital gangrene, I saw camp gangrene, which is probably an analagous disease, and I am satisfied that his ideas in regard to the infectiousness of this disease are eminently right and proper. At that time we knew very little about asepsis; we had but a vague idea of it. We knew that certain remedies had power, to a certain extent, to correct infectious disease—local remedies. But this knowledge has been developing during many ages, until it has culminated in our present advanced condition. In the treatment of hospital gangrene I found that isolation was absolutely essential, and that it was necessary to confine the cases, not in houses, but under tent flies. It being nearly always warm weather, I placed them under tent flies and the shade of trees that the air might sweep over them fore and aft, and I found that that was one of the best methods I could adopt.

In regard to the local treatment of camp gangrene, not possessing at that time what we now find to be the best remedies, I treated them with a concentrated solution of sulphate of zinc, and ultimately with bromine, when I could get it. They were the most powerful antiseptics I could find. I made a concentrated solution of the sulphate of zinc and sulphuric acid and my rule was to dress these cases with hot-water applications; if I could procure it on the battlefield so much the better. I had a favorite servant who took his hot-water camp kettle and tin cup and poured the hot water on the wounds of our men and washed them thoroughly, and then when any symptoms of gangrene occurred I saturated cotton with sulphate of zinc and kept it applied, and the stimulating effect of this upon the wound was wonderful. Sloughs would separate and granulating surfaces would appear, and as soon as they appeared the application would prove so painful that I would be compelled to suspend it. I was not always able to procure bromine—of which I can not speak too highly in cases of camp gangrene. I also believe that nourishment and powerful stimulants are essential in the treatment of this disease.

Gentlemen, I will not detain you further in this discussion.

LAPAROTOMY IN CASES OF GUNSHOT WOUNDS OF THE ABDOMEN.

By Dr. P. S. CONNER, of Cincinnati.

Of the serious gunshot wounds coming under care, none are more grave than those in which penetration of the abdominal cavity has occurred. Though it is not altogether true as stated by Gale three hundred years ago: "If the shot have pearced through the bellie, and have wounded either the stomacke, liver, splene, kidnies, intestines, bladder, or any of the great veines or arteries, then there is no hope of life to be looked for," yet the mortality rate of these lesions is very high. That individuals may recover and have recovered from wounds of the solid or hollow viscera, even of the small intestine, can not be denied. In very many of the cases, though, reported as of this nature, in which healing took place, reasonable doubts may be entertained as to the correctness of the diagnosis; based as it not seldom was upon shock, hemorrhages from stomach or bowels, gaseous distention, or the course of the ball—each and all of more or less uncertain diagnostic value. But eight years have elapsed since the lamented Parkes, in this city, as chairman of the surgical section of the American Medical Association, delivered his memorable address, in which were detailed the results of many experiments upon dogs, and direct operative interference in cases of wounds of the abdomen advised and urged. From the time of the delivery of this address, following as it did close upon that of the operations of Kinloch (1881), Kocher (1883), and Bull (1884), may well be dated the introduction of laparotomy as a proper and systematic method of treatment.

The questions before us for consideration are, does this operation lessen the danger of a fatal result of the shot wound, and if so, under what conditions, and why? That these questions may be satisfactorily answered, it must be first ascertained, if possible, what is the death rate of the cases not operated upon; and just here lies the greatest difficulty in the solution of the vexatious problem. The reports from the great wars of the third quarter of our century show that 65 to 92.5 per cent of the cases coming under treatment died, and they were only a minority of the whole number wounded, the majority quickly dying on the field, of hemorrhage. But these statistics can not be taken as a basis of argument. The wounds were made by bullets of large size, the cases came comparatively late under care, and protection against septic infection from without was very imperfect. In the wars of the future the bullets used will probably be of a caliber of about 30, instead of 55, 50, or 45, as before, and antiseptic treatment, more or less rigorous, according to circumstances, will be employed. The primary damage and the secondary risk must, therefore, be markedly diminished.

It is in the termination of the injuries of civil life, ordinarily produced by pistol balls, and those, too, observed during the last twenty years, that we must find, if anywhere, the death rate of abdominal wounds treated other than operatively. The data afforded are, unfortunately, very limited, and there must enter into the calculation elements that are very disturbing in the widely different conditions of time and place under which the wounds were treated, and the greater or less thoroughness with which an antiseptic state was secured and maintained. Stimson found that at the Chambers street, New York, and Roosevelt hospitals, in the years 1876–1884, of the 23 cases treated without operation 15 died—65 per cent. T. G. Richardson reported to the Surgical Association in 1887 that in the preceding five years 32 cases had been treated without operation in the Charity Hospital of New Orleans, of whom 19 died, i. e., 59.4 per cent. Reclus & Noguès collected, chiefly from journal reports, 91 cases, of which 22 died—24 per cent; but it must be remembered that it is always largely the fortunate, exceptional cases that are thus reported, and further, in a considerable number of the cases that recovered the symptoms as stated in the table can not be accepted as of positive diagnostic value. Neither vomiting, hemorrhagic discharges from stomach or bowels—certainly if small in amount—shock, gaseous distention, or the apparent course of the ball, proves that a viscus has been

wounded. In 3 or 4, or it may be 7 per cent of the cases a bullet will enter and pass through the abdominal cavity without doing such damage.

Senn found that in 1 of the 5 cases upon which he operated, and in 5 of the 14 experimental wounds made upon the cadaver, no intestinal or other visceral injury of moment was inflicted; but such experience is certainly very exceptional. In the large majority of cases of penetration there is wound of viscus or viscera, and the symptoms just mentioned are present in greater or less measure. On the other hand, it has not seldom been found upon autopsy that though symptoms were absent, or present in but slight degree, penetrations and perforations had occurred. It is much to be regretted that we have not a report of the cases under treatment in the various hospitals of all our larger cities during the last twenty years, for had we such, a tolerably close approximation to the mortality rate of the cases not operated upon might be secured. There are, of course, many difficulties in the way of procuring such statistics, but efforts certainly should be made to collect them.

What in contrast is the death rate of the cases upon which laparotomy has been done? Here we are upon more certain ground. Körte collected 64 cases, with 42 deaths—65.6 per cent. Morton 110 cases, with 74 deaths—67.27 per cent. Barrow 112 cases, with 74 deaths—66 per cent. Martin and Hare 129 cases, with 86 deaths—66⅔ per cent. Coley 165 cases, with 111 deaths—67.2 per cent. An average mortality of 66.7 per cent. There is, of course, present the error always associated with statistical tables based upon journal reports made by many operators, to wit, an undue proportion of successful cases published. Stimson found that at the 3 New York hospitals already specified (Chambers street, New York, and Roosevelt), in the years 1884–1889, 16 laparotomies were done, with 13 deaths following—81.2 per cent, but here the numbers are so small that a just conclusion can not be drawn from them.

To eliminate as far as possible the errors arising from suppression of unfavorable cases, from limited number of patients, and from the influence of place and operator, I addressed a few months ago a circular letter to the members of the American Surgical Association, and certain other well-known surgeons in our Eastern, Southern, and Western States, asking a report of the whole number of cases operated upon by each and the number of recoveries following. Answers were received from 73; 18 had never operated; the remaining 55 had done 174 laparotomies; 123 of the patients died—70.67 per cent. I have not included in my table a report sent to me of 14 operations done at the city hospital of St. Louis in less than twelve months ending March 10, 1893, with 10 recoveries; a mortality of 28.5 per cent. Were these cases taken in, the number of operations would be increased to 188, the deaths to 127, and the mortality rate reduced to 68 per cent.

Twenty-three operators reported each a single case, with a death rate of 82.6 per cent. Twenty-three others had operated 2, 3, or 4 times, the mortality rate of their 65 cases being 80 per cent. Four had operated 5, 6, or 7 times, 18 of their 26 cases dying—69.23 per cent. Five had operated 8, 10, 14, and 18 times, respectively, with a mortality rate of 75, 40, 90, 66⅔ and 33⅓ per cent.

A decidedly lower death rate is found, as might be expected, in the practice of those who have done the operation several times. That a large number of intestinal perforations need not necessarily prevent a successful result is shown by one of Miless' (New Orleans) cases in which there were 16 of such injuries. In another case of equal number (Halsted's), which, however, did not terminate favorably, 2 circular enterorrhaphies were made.

So far as may be indicated by the comparatively small number of cases collected, the chances of recovery are greater when operative interference is not made—38⅓ per cent taking the Reclus, Stimson, and Richardson cases together, as against 68 or 70 per cent. But that comparison of figures may properly be made and opinion based thereon, the classes of cases must be fairly comparable. Are these that are under consideration? Most certainly not. The Reclus table is made up largely of scattered cases, not a few of which were reported because their result was not that

usually observed. The hospital statistics given are much limited in time and number. Another set of 50 cases in the same hospitals might have shown a fatality of 70 or 80 per cent or more. Again, many of the laparotomies were done only after abstention had for a day or days been practiced, until grave symptoms had presented themselves and the death of the patient was almost certain to occur, unless prevented by section, ligation, and suture. The fatal result in such should surely be regarded as in spite of, not in consequence of, the operation. The wisdom of a laparotomy done in extremis may generally well be questioned, though every once in awhile an apparently hopeless case will be saved by it; but an unfortunate termination of it should be credited to the preëxisting conditions, to the time, the manner, it may be, of its performance, not to laparotomy as a method of treatment. The time element is a very important one in any abdominal section, especially so, we may well believe, in that for gunshot injury. A short exposure, ready discovery of the few wounds present, easy suturing, and early closure of the operation wound means much less risk to the patient than does hours-long searching for and stitching up of multiple lesions. In Martin and Hare's table the mortality of operations completed in an hour was only one-third of that of those lasting twice as long.

Of what do the subjects of abdominal gunshot wounds die? Of shock, hemorrhage, or septic infection. Few of those coming under care, and not operated upon, perish of shock; while, on the other hand, shock is not seldom an important factor in the production of a fatal result in those submitted to operation; shock consequent upon prolonged exposure and extensive handling of the intestines. Here lies one of the dangers of active interference. To simply open up the abdominal cavity is a small matter, exposing the patient to very slight risk; but to thoroughly examine the intestinal tract and to locate wounds of it, and also those of the associated viscera, can not but take considerable time and give rise to decided nervous disturbances. The greater the experience of the operator the quicker and more systematically will he work, but in cases other than those in which the lesions are few and slight, the time required and the exposure which is unavoidable can not but exert a positively injurious influence upon the chances of recovery. It is much to be regretted that we have not some quick, certain, and safe method of determining the place and number of intestinal lesions. Insufflation, which at first seemed to so satisfactorily answer the indications, has been shown to be unreliable, even injurious; not always revealing the existence of a perforation, at times making it more difficult to replace the intestines, and occasionally, at least, causing fecal extravasations. I have myself once seen it fail of accomplishing its desired purpose because of fecal accumulation in the colon, and in one of my operation cases there had taken place such adhesion of the omentum to the inner opening of the track through the abdominal wall that no gas could have escaped from the entrance wound. Had the test been employed there might have been observed a rapidly increasing distension of the abdomen, of diagnostic value; and again there might not.

A very considerable proportion of cases die of hemorrhage, and without doubt much of the fatality attributed to shock has been due to collapse, the disturbance being primarily vascular, not nervous. That there has been such loss of blood may be determined in doubtful cases by hæmoglobin measurement, as suggested by Martin and Hare. Bleeding from other than a small vessel, or from a considerable laceration of the liver, spleen, or kidney, is not very likely to cease spontaneously; and if it does not there can, under the non-operative treatment, be but one result. Even if the hemorrhage does stop, if it has been to any considerable extent, there is left in the cavity a most excellent culture medium for septic organisms carried in from without or escaping from the intestine. Where there are symptoms present proving or rendering probable that active bleeding is going on, laparotomy should always be done. It may not be possible to effect the necessary ligation, but generally it will be, and the patient given some chance of recovery. He may die, and very often will, but not in the majority of cases, certainly, in consequence of the laparotomy.

A very large proportion—practically, we may say all—of the deaths occurring after the first few hours are because of septic infection. And how could it be otherwise? The bullet itself may, though only very exceptionally, carry in the pathogenic organism. The experiments of Assistant Surgeon La Garde, U. S. Army, and of Messner have proved that the hitherto universally accepted belief that the heat of the explosion must destroy all organisms is not founded on fact. Any piece of clothing carried in is necessarily more or less infectious. The skin bacteria may readily be conveyed internally upon the foreign body introduced. The track of the ball offers a way of approach for the germs in the air. Pyogenic cocci in the circulating fluid may be deposited in the clot. The opened intestine contains them in abundance; and the ever-present colon bacillus may exert its deleterious influence, even though the wall of the intestine is not pierced. Fecal extravasation, which fortunately occurs in but a small proportion of the cases, can not but cause a bacterial inflammation, occasionally limited, but ordinarily generalized. If the organisms are but few, they may be safely disposed of by the peritoneum; if in abundance, they cause a rapidly destructive toxæmia, or, as is more often the case, one slower but scarcely less dangerous.

However produced, the development of septic infection is usually but the prelude to a fatal termination of the case, unless laparotomy is quickly done, the parts cleaned, and drainage secured; and even then the chances of recovery are so slight that many surgeons have declared that the operation should never be done under such circumstances; that it is only likely to do more harm than good. But such declaration is too sweeping. Here, as in other questions of surgical diagnosis and treatment, the words "ever" and "never" should have no place in our language.

That non-operative treatment may be successful hemorrhage must be slight, the wound of the intestine, if intraperitoneal, so small as to be spontaneously closed by contraction, approximation of its edges, or by eversion of the mucous coat; or protecting omental or bowel adhesions must be quickly formed; or firm attachment to the parietal peritoneum must occur; or, suppuration taking place, it must be localized, so that the resulting abscess may safely be opened, or open of itself externally—of likely occurrence only in wounds of the large intestine, or of the kidney from behind. An exceedingly interesting illustration of the protective influence of an omental plug in the external wound was reported by Assistant Surg. Patzki, U. S. Army (1872). Though the wound (by a bullet of caliber .38, at very close range—1 foot) was located 1½ inches above the umbilicus and one-fourth inch to the right of the median line, not an untoward symptom was manifested, and healing was complete on the seventeenth day. When the patient was first seen there was a constricted omental protrusion 2½ inches long, which was removed six days later with the wire ecraseur.

Leaving out of consideration the cases in which there is extensive hemorrhage or discharge externally of fæces, urine, or bile—cases in which operation should certainly be done, and that as soon as possible—the propriety of laparotomy must be determined by consideration, on the one hand, of the likelihood of the occurrence of septic infection if it is not done; and, on the other, of the probable amount of shock that may be expected in the doing of it; bearing in mind all the while the fact that the necessary manipulations of the laparotomy may be a determining cause of toxæmia, in the breaking up of already formed protective visceral adhesions.

When the wound has been made by a ball of quite small caliber, especially when it is well above the umbilicus, or when it is near to the lateral line, and the probable course of the ball has been away from the center of the abdomen, in the absence of any grave symptoms abstention is the wisest policy. When, on the other hand, the bullet is large, the direction of the shot and the location of the entrance wound indicate possible—still more, probable—injury of the intestine, especially the small, and that multiple, or of a solid viscus or the bladder, operation should be done. Because of hemorrhage or septic infection such wound, left to itself, will very

generally prove mortal; and the ill effects of shock and danger of breaking up any existing adhesions are not to be weighed against the benefits of closing wounds and cleaning the peritoneal sac. When there is any reasonable question as to penetration of the cavity, the wound should be followed down until the peritoneal opening is found or its absence made certain.

To every judicious mind occupied with the problem now before us it must soon become apparent that no unchanging and unchangeable law can be established. Cases may and do recover when left to themselves; operations may and do cause death. Every case coming under care must be a law unto itself, and is not to be treated in one way or another because statistics show that to be the better one. Nothing is more fallacious than experience, except figures; and he who bases his treatment of abdominal wounds upon arithmetic is not wise.

The technique of the operation has, in large measure, been definitely settled. In the great majority of cases section of the abdominal wall in the median line is much preferable to that farther out or through the external wound, permitting as it does of the quickest and most thorough examination of the contents of the cavity. A free incision is better than a short one, because of the resulting saving of time in the after steps of the operation. The bowel should be run over with as little exposure of it as possible, determination of the direction of its examination being made by reference to the relations of the mesentery.* When the intestinal damage necessitates removal of a portion of the bowel, either because of the primary extent of the lesion or because suturing the wound would be followed by dangerous stenosis, the choice of operation will lie between circular enterorrhaphy and lateral anastomosis, the former at present being most in favor. Very possibly the "Murphy button" may be employed with great advantage. Though drainage may safely be dispensed with in many cases where the lesions are comparatively slight, yet because of the possibility even in these of accumulation in the peritoneal sac of serum, germ laden to a degree beyond the capacity of the membrane to safely take care of, it is prudent to use a drainage tube for at least the first two or three days. When there has been extensive extravasation of blood, or of bile urine or feces in any amount, the tube should always be employed.

How far operative interference can be carried in military surgery is to be determined only by future experience. The wounds may be expected to be less severe than those heretofore met with, the bullet being of smaller caliber, harder and smoother, its velocity markedly greater, it will undergo neither deformation nor deflection; it will not lodge. The intestinal wounds produced will probably be found to be of less size, with edges less contused, and because of the through and through piercing of the body early drainage of the cavity will be more complete; though this may perhaps be prevented by the smaller diameter of the track through the soft parts, and the resulting more frequent falling together of its walls. Recent experiments by Griffith (Kansas City) seem to indicate that when the intestine is distended with fluid extensive and rapidly fatal lacerations of it will occur on account of the great hydrostatic pressure developed by the impact of the rapidly moving shot. A like greatly increased hydrostatic pressure in the liver and spleen must render more grave the lesions of those organs. That laparotomy may properly be done and recovery therefrom made other than accidental, the wounded man must soon come under care, the operator must have time enough in which to work and those things at hand necessary to antiseptic operation and dressing, and the patient must be kept quiet until healing has taken place. How often can such concurrence of favoring conditions be reasonably looked for?

If what is known to-day warrants dogmatising, which is very questionable, it may be said: (1) Neither always nor never should laparotomy be done. (2) When the

* "Lift any segment of the small intestine, make tense the mesentery, pass the hand back to the spine with palm against the smooth tense mesentery. The border of the hand, looking toward the patient's head, is next to the upper segment of the bowel."

wound has been made by a small ball (caliber .22 or less), especially if it is well above the umbilical level, or, without regard to the size of the bullet, is far out toward the lateral line, and it may reasonably be expected that its course has not been toward the median line of the body, and if the patient's general and local condition is good, abdominal section should not be made. (3) When symptoms indicate decided hemorrhage or fecal extravasation operative interference should be made at the earliest possible moment. (5) When the bullet is of medium or large size, has in all probability passed through the area occupied by the small intestines, or wounded the liver, spleen, kidney, or bladder, laparotomy should be done, and that as soon as possible. (5) Even if peritonitis has developed, its presence does not contraindicate operation, though it makes the prognosis much more grave.

REMARKS OF PROF. ALBERT VANDERVEER, M. D.

Mr. President and Gentlemen of the Section: Dr. Conner has had an exceedingly difficult subject to handle. He has gone over the ground in a very systematic manner so far as he is able to give us statistics, and has carefully weighed them in a conservative manner. When we come to study his paper later on we shall find that it contains a great deal of true merit and much which will be of value to the surgeon in an emergency when treating a case of gunshot wound of the abdomen.

I regret the absence of Dr. Bryant. I know him so well that whatever facts he might have given us here in the way of discussion would be given in a straightforward and honest manner, and have added interest to the statistics which Dr. Conner has brought to our attention. We also regret the absence of Dr. McGuire, whom we all respect so much.

Now, as regards my own position here in discussing this paper, it is one that we have to approach, as it were, on the spur of the moment. We have had no abstract given us of the paper, no points presented. One has to follow up a paper of this kind and perhaps jot down his impressions and weave them into the line of thought presented. I was pleased to have Dr. Conner exercise somewhat the element of doubt with reference to cases that are reported as cases of recovery without operation. I believe that many of these cases are exceedingly doubtful, and that many misstatements have been made for the purpose of getting the case on record as one of recovery from penetration in which the bullet had not entered the cavity at all. On the other hand, again, I believe that many cases are not recorded where an operation has been made.

I entered the Army during the late war in the spring of 1862, and I remember a very painful experience of nearly four years in watching gunshot wounds of the abdomen. I saw them on the battlefield, and well do I remember seeing some of my fellow officers, whom I attended and had learned to love as brave soldiers, brought in suffering with gunshot wounds of the abdomen, inflicted by the large bullets in use during that war. We saw cases that were sickening to look upon. I call to mind several cases in which, although an attempt was made to close the wound in a natural manner, it was found to be impossible.

The few autopsies we were able to hold showed that the most of these cases really had hemorrhage.

Now, when we come to watch these cases in civil practice we shall have a different class to deal with. We shall have a class of cases in which the caliber of the bullet must be taken into consideration. It is not so great. Many of these wounds are from a .22-caliber weapon, which does not do the same amount of harm. It does not give to the abdominal cavity that amount of shock which the larger bullet does.

The symptoms of penetrating wounds of the abdomen are certainly very uncertain. We have a condition in which the patient for a few hours does not present any alarming symptoms, but there is a hemorrhage going on which ultimately proves fatal. Now, we must take into consideration the make-up of our patient.

This is a condition that must be considered, and we must look over it carefully as we examine the patient, especially as to the element of shock.

I have placed a great deal of stress upon the first examination of patients. I spend quite a good deal of time in learning as to the direction of the bullet. How did you stand? What was the position of the one who fired the shot? This in order to ascertain the direction the bullet may have taken. The intestine may not be injured at all.

Now, if we have a case in which we think that hemorrhage is present let us confer with the responsible party, the parent or guardian. Let us put the case fairly and squarely before them; and the patient must also understand it. The cases where the element of hemorrhage is present ought not to be left at all. Do the operation at once. Go on with it, for the hemorrhage must be controlled. The foreign substances must be looked after carefully, and in that direction some good is to come. The case in which there is an escape of fecal matter without hemorrhage, and in which the patient died without hemorrhage, is a reproach.

Now, as to the test that we may make for doubtful cases. Concerning the use of gas I must say that my belief in that is badly shaken, and, all things taken into consideration, I am opposed to it.

We stand on ground, as regards the closing of the wound, a good deal as we have stood for some years regarding the best method for the cure of hernia. No man can say this is the best method for curing hernia. We must take any method that will close the wound the quickest; and let it be done with celerity, but not undue haste, and the surgeon should be thoroughly familiar with his work. Close the wounds in the method that can be done the quickest. The man who can do the operation the quickest can do it the best.

Now, as to the employment of drainage, in these cases of hemorrhage where the intestine has been perforated. It is of the greatest importance that drainage should be made use of in order to avoid the possibility of closing in septic material. A thorough washing and cleansing of the abdominal cavity, and thorough drainage, may save your patient.

We should, as conscientious men doing this work in abdominal surgery, place upon record every case we have, and I earnestly hope that this will be one of the points that will be carried out thoroughly in the Army hospitals, where a systematic course can be pursued as regards the collection of statistics. It should also be done in private hospitals. I know of two or three cases in my own city that were not reported. They were fatal cases, although I may add that they would have been so in the hands of anyone. I have no fault to find with them for this—only that they should have been reported.

REMARKS BY CAPT. LOUIS A. LAGARDE, ASSISTANT SURGEON, U. S. ARMY.

With reference to the distinctive effects of the projectile of the new armament upon the abdominal viscera in future wars there are several things to be considered.

We all know that the amount of destructive effects in gunshot injuries depends on three factors—(1) the velocity of the projectile on impact, (2) its deformation, and (3) the resistance offered by the part hit. For the abdominal contents we may practically throw out deformation. We then have but two factors—resistance and velocity.

The two things in the human body principally concerned in offering resistance to projectiles are the hard bones and fluids. Reasoning thus, we are to estimate the destructive effects in this particular region by the velocity of the projectile and the amount of fluid contained in the various organs, the alimentary canal included.

Burns, Hobart, and others have noticed the effects of the small jacketed projectile on the heart, lungs, liver, spleen, and intestines and they report that they are enormous in the zone of explosive effects, which for the new armament extends

to 350 yards, and in tissues containing much fluid enclosed in cavities with rigid walls like the brain, heart, and lungs up to 500 yards.

Griffith, of Kansas City, lately performed experiments on the Fort Leavenworth range on live dogs with the Krag-Jorgensen rifle within 200 yards. Three of the animals were shot through the abdomen and they are reported to have died as promptly as though they had been electrocuted. The post-mortem showed the wound of entrance equal in diameter to the caliber of the projectile; the wound of exit scarcely exceeded this diameter. Upon opening the abdomen the amount of destruction was found to be very extensive. The intestines were not only perforated in the track of the projectile, but they were more or less pulpified. The surprising thing about his results was that no vital part was hit which might account for the instantaneous death of the animals.

Owing to the resistance offered by the abdominal contents and the high velocity of the small jacketed bullet, both of which are concerned in determining destructive effects, I doubt if the skill of the surgeon will avail in saving human life in this class of wounds, especially when they are inflicted within the zone of explosive effects. Beyond this range the conditions in the wounds will certainly be more favorable, and this will be due especially to the smaller caliber of the new projectile.

REMARKS BY DR. AUGUSTUS C. BERNAYS, OF ST. LOUIS, MO.

Mr. President and Gentlemen of the Section: I only rise to make one point in this discussion, which, however, will be admitted to be of probable importance. By way of introduction I will say that the treatment of gunshot wounds of the abdomen has been particularly in my line of work, as those know who have followed the literature of the subject, and I am pleased to say that the conclusions arrived at by Dr. Conner to-day are almost in exact accord with my own, reached after a period of about ten years. I think the first operation I made was in 1882; and, strange to say, just before coming into this hall I called at the library of the Surgeon-General's Office and asked to see the transactions of the Surgical Association of German Colleges, of which I am a member, where this subject was discussed in April last, the paper being read by Von Bergman and discussed by several German physicians of prominence, and I found the conclusions were almost identical with those of Prof. Conner here to-day.

When I first published my paper on my first five cases (of which three were successful), I was a rabid enthusiast in regard to laparotomy in gunshot wounds of the belly. I labored under an erroneous idea as to the danger in gunshot wounds of the intestines. I believed that Sir William Thompson, who states that 99 per cent are fatal, was thoroughly wrong.

Now, the point I want to make is this: In regard to the condition of the intestinal tract so far as containing or not containing victuals is concerned, I know from my own experience, and I have had about 1,045 cases, that preparatory starvation must be resorted to and the operation done when the tract is absolutely empty. When this course is followed it is perfectly wonderful to see how rapidly the patient recovers.

I had an instance in my experience in gunshot wounds which will illustrate this. I operated on a boy who was shot between 5 and 6 o'clock in the evening, the bullet entering just below the kidney and making its appearance near the umbilicus. I found eight perforations of the smaller intestines, and no large vessel bleeding. Of the eight holes which were made by the bullet passing from intestine to intestine, I only stitched three; the others I thought it would be an error in the way of surgery to touch. Now, that boy's intestines were entirely empty, he having had dinner at 12 o'clock, and the result was that he rapidly recovered. I want to make the point that when a soldier goes into battle it should be upon an empty stomach. I believe it would be good surgical treatment not to perform laparotomy unless there were signs of hemorrhage, and that such men would get well. In one case I had the

patient was a gourmand. I found cabbage, potatoes, pieces of venison, etc., loose in the abdominal cavity. That man would have died without the operation. We all know that the contents of the intestine contain certain numbers of saprophytic bacteria, and probably some pathogenic bacteria as well. At least it is possible, and therefore, in the case of a man shot soon after partaking of food, I think that laparotomy is indicated in every case, and I would advise the starvation treatment and absolute rest. I would go so far as to put a plaster of Paris dressing over the abdomen. In these days of antiseptic surgery the point of giving the injured parts rest is being sadly overlooked by a great many surgeons. It is just as important to give an injured limb rest as to prevent infection.

ADDITIONAL REMARKS BY PROF. P. S. CONNER, OF CINCINNATI, OHIO.

MR. PRESIDENT: I have but a word to say in addition to what I have already given on this subject. It is one of extreme interest to me, and it is one which can not be disposed of in the words "ever" or "never." What we need especially is the truth with regard to what has been done. To know how many have been successful, and, if not successful, the reason why. I want to get, if I can, a statement of all laparotomies done in this world by physicians, and I would take it as a great personal favor if any one present; knowing of operations having been done, will give me the name and address of the operator, that I may ask him how many times he has operated and what the result has been. I may add that I have operated on seven cases.

ARE PROJECTILES FROM PORTABLE HAND WEAPONS STERILIZED BY THE ACT OF FIRING? CAN A SEPTIC BULLET INFECT A GUNSHOT WOUND?

By LOUIS A. LAGARDE, Captain and Assistant Surgeon, U. S. Army.

[From the laboratory of the Johns Hopkins University and Hospital.]

In the following paper I will endeavor to show that (1) the majority of projectiles in original packages are sterile or free from septic germs; (2) a projectile contaminated by a specific pathogenic microbe is apt to produce its specific disease when fired into susceptible animals; (3) the projectile of the small-bore rifles forming the armament of the European armies, does not readily become contaminated in ricochetting; (4) the medico-legal phase of gunshot wounds in the light of the results obtained; (5) conclusions.

The communication of sepsis by projectiles is a subject almost as old as the history of gunpowder. The literature of gunshot injuries shows that it comes up for discussion periodically, and especially upon the breaking out of every war. The great improvements that have been made in the military rifle in recent years, and the superior velocity and penetration conferred upon the new jacketed projectile, have once more revived the question of septic bullets.

The notion was pretty generally entertained prior to the evolution of the new armament that projectiles were purified by the act of firing, and, among the more prominent advocates of this notion, I would mention the names of Esmarch and Volkmann. With the advent of the highly polished projectile of hard exterior, which encounters so much more resistance than the softer leaden bullet of the old armament, the claimants of the asepticity of projectiles by the act of firing again advanced their side of the question. I believe it was Bruns who, upon picking up a steel-jacketed bullet that had just traversed a resistance target, found it so hot that he was led to remark that he did not see how organisms could live upon the projectiles because of the great amount of heat which it exhibited.

Until the advancements in our bacteriological technique had come about it was impossible to accurately determine the pro or con of this important question. Those

who in former times advocated the asepticity of projectiles did so upon the evidence afforded by their uniformly good results in the clinical field, while those who opposed the idea did so upon evidence furnished by unfavorable results in the same quarter.

As a preliminary to the work of noting the effects of firing bullets that had been previously contaminated, it was considered proper to ascertain the condition, bacteriologically speaking, of bullets in their original packages. This was done with the result shown in the subjoined table A.

We find that out of 26 gelatin rolls (Esmarch tubes) examined, there were altogether 26 colonies, and that 14 of the tubes had no colonies, while the remaining 12 tubes contained a total of 26 colonies with a maximum of 4 and a minimum of 1. Since each tube represents the number of microörganisms on 1 bullet, we conclude from these data that 53 per cent of the missiles examined were absolutely sterile, and that the remaining 47 per cent were practically so.

TABLE A.—*Cultures from bullets taken out of original packages.*

Date.	Number of cultures.	Caliber.	Whence obtained.	Medium in which bullets were placed.	Date of observation.	Result in colonies.
May 31, 1892..	1	.22	Ammunition store in Baltimore	Gelatin roll...	June 5	1
June 2, 1892..	2	.22	....do....	....do....	June 7	.....
Do.....	3	.22	....do....	....do....	....do....	1
Do.....	4	.22	....do....	....do....	....do....	.....
Do.....	5	.22	....do....	....do....	....do....	.....
Do.....	6	.22	....do....	....do....	....do....	4
Do.....	7	.22	....do....	....do....	....do....	.....
Do.....	8	.38	....do....	....do....	....do....	2
Do.....	9	.38	....do....	....do....	....do....	.....
Do.....	10	.38	....do....	....do....	....do....	3
Do.....	11	.38	....do....	....do....	....do....	.....
Do.....	12	.38	....do....	....do....	....do....	2
Do.....	13	.38	....do....	....do....	....do....	.....
Do.....	14	.38	....do....	....do....	....do....	1
Do.....	15	.38	....do....	....do....	....do....	.....
Do.....	16	.38	....do....	....do....	....do....	1
Do.....	17	.38	....do....	....do....	....do....	.....
Do.....	18	.38	....do....	....do....	....do....	4
Do.....	19	.38	....do....	....do....	....do....	.....
Do.....	20	.38	....do....	....do....	....do....	.....
Do.....	21	.38	....do....	....do....	....do....	2
Do.....	22	.38	....do....	....do....	....do....	.....
Do.....	23	.38	....do....	....do....	....do....	.....
Do.....	24	.38	....do....	....do....	....do....	2
Do.....	25	.38	....do....	....do....	....do....	.....
Do.....	26	.38	....do....	....do....	....do....	3

Because examination of a number of bullets from the same source since the data were collected in Table A fails to show any pyogenic bacteria we conclude that the remaining 47 per cent were practically sterile.

These results are what we might expect, when we consider the process employed in the manufacture of cartridges in detail.

Ordnance Memoranda, No. 8, of the U. S. Army, 1870, describes the method of manufacture of the center-fire metallic cartridge, which is about the same as that employed by private firms.

Although there have been some improvements in the process of manufacture since the circular was issued, the employment of heat and the use of acids and alkalies remains about the same.

The cartridge consists of the following parts: (1) The case of copper or brass, (2) the cup anvil, (3) half a grain of percussion composition, (4) 70 grains of musket powder, (5) a lubricated bullet weighing 500 grains.

During the manufacture of the copper cases they are annealed once or twice by subjecting them to a red heat in a charcoal fire. They are subsequently treated once with a solution of sulphuric acid in water (1 to 15), and twice finally with a solution of caustic potash and caustic soda, 1½ pounds of each to 5 gallons of water, after which they are thoroughly dried in a drying room at a temperature of 125° F.

The lead of which the bullets are made is melted and skimmed of dross, after which it is cast into cylindrical molds of suitable diameter and length. The subsequent

steps of compressing the lead and cutting the bullets into proper length is done entirely by machinery.

The act of loading is also accomplished by machinery, and before each bullet is pressed into its copper case its surface and cannelures are lubricated by a mixture of grease and wax which has been previously subjected to a high temperature.

The cartridges are finally packed and hermetically sealed into paper boxes, the frames and skeleton divisions of which are made of tarred boards. The employment of heat, acids, alkalies, and absolute cleanliness are necessary to insure the keeping qualities of the powder and to obtain constant results in firing.

As additional evidence of the sterile condition of projectiles, we have but to refer to the clinical history of the wounds inflicted by them. The consensus of opinion among surgeons is that gunshot wounds are, as a rule, aseptic, and I believe the data in Table A explain why this is so.

If we make, as a contrast experiment, a bacteriological estimate of the number of microörganisms on bullets that have been kept loose in a bureau or washstand drawer, or on shelves in a closet, the usual places for storing these projectiles at home, or if we will take cartridges from the belts of men in barracks or from lots that have been lying in camp out of the original packages for some time, not to speak of the cartridges in time of war which are carried by the men in all kinds of weather for days before actual battle, we will find, on dropping cartridges from these sources into gelatin tubes and then converting the latter into rolls, that the number of colonies which will develop under favorable conditions of temperature will not correspond to a maximum of 4 and a minimum of 1, as observed in the specimens examined from the original packages, but that the minimum will be more apt to correspond to scores, and the maximum so great that counting will become irksome.

Knowing that microörganisms are, as stated, found on unclean bullets, the following experiments were conducted to determine whether germs were still apt to be found on projectiles after firing: To be sure that the germs, if found, emanated from impurities on the bullets and not from the weapon employed, a six-chambered Colt's revolver, .38 caliber, was thoroughly sterilized by subjecting it to a moist heat in an Arnold's sterilizer for an hour before firing.

Twelve .38-caliber cartridges were thrown upon the floor of an unswept room. The room was then swept and the cartridges and sweepings placed in a dustpan, from which the former were taken as often as it became necessary to load the revolver.

At a range of 13 feet these projectiles were fired upon an iron target enveloped in a wire screen, the target and the screen having been previously sterilized by the flame. As each shot was fired the iron target was slipped out of the screen through a slit at one side and subjected anew to the flame by an assistant, while I occupied myself in transferring the pieces of the leaden bullet with sterilized forceps into a test tube of melted agar-agar. This done, the wire in turn was again subjected to the flame and the target put back in place. This process was observed after each shot.

At the end of the firing the test tubes of agar-agar, which had been in the meantime kept at a temperature of 40° to 42° C., were converted into rolls (Esmarch tubes). At the end of forty-eight hours, at the ordinary room temperature, the majority of the tubes contained scores of colonies. The smallest number of colonies in any of the tubes was 17.

I should state in this connection that the fragments of lead in the agar-agar showed a great deal of undissolved dirt still adherent to them, and that the number of colonies observed did not in all likelihood represent more than a fraction of the microörganisms in each tube.

As already stated, clinical evidence teaches us that the majority of gunshot wounds are aseptic. But we know also that pyæmia, erysipelas, tetanus, malignant odema, etc., do at times occur after gunshot wounds. Such complications are generally attributed to ignorance or neglect on the part of the surgeon in the application of his primary dressing, to unnecessary exploration with septic fingers or probes, or from dirt or pieces of clothing having been forced into the wound by the missile at the time of the injury. From the teachings of the present day, I believe I am correct in stating that a gunshot wound, in which all the faults mentioned have been excluded, would be considered aseptic—free from any inherent danger of infection—by the vast majority of surgeons. Is this so? Could there not be a source of infection which we are overlooking, the elucidation of which might go far to explain conditions that have been very puzzling to us in the past?

The experiments with the bullets which lay in the sweepings before firing would seem to prove conclusively that microörganisms on bullets are not destroyed by the act of firing, certainly not when fired from a .38 caliber Colt's revolver.

Lest there should have been some error in these experiments, I adopted the plan

of using a very uncommon germ, and one which, at the same time, possesses the merit of being readily recognized by its morphology and specific effects on animals.

In this connection, therefore, I wish to call attention to the following tables, which give in detail certain experiments made to determine the fate of anthrax germs in various forms when applied to bullets before firing:

TABLE B.—*Experiments with infected bullets.*

[Organism placed in a small hole in the conical end of bullet, the hole being finally sealed with wax; used Colt's revolver, caliber .38; organism used, anthrax spores.]

Date.	Range.	Sterilized material used as a target to recover bullets.		Media used in making cultures from bullets.			Date of observation.	Result.	Remarks.
		Jute.	Cotton.	Agar.	Gelatin.	Bouillon.			
1892.	*Fect.*								
June 13.	10	.....	1	1	.....	.....	June 14, 15, 16, and 17.	No colonies.	Ball recovered in cotton split in two lateral halves. Each half was put into an agar tube, and the latter were converted into rolls.
Do...	10	.....	.....	.....	.....	1	June 14.	Anthrax bacilli.	The ball missed the basket of cotton, struck a brick wall, and bounded back 13 feet. It was immediately picked up with fingers and placed in tube of bouillon.
Do...	10	.....	.....	1	.....	.....	June 16.	....do	The ball missed the basket of cotton, passed into a barrel, was recovered through bung-hole, and put in an agar tube, the latter rolled on ice.
June 14.	10	.....	1	1	.....	.....	June 17.	....do	Ball recovered in cotton with sterilized forceps, dropped in agar, etc.
Do...	5	.....	1	1	.....	.....	June 15, 16, and 17.	See remarks.	As no colonies had formed on the 17th, the bullets were examined and each orifice was found sealed with the wax. The plug of wax and bullets were dropped into two bouillon tubes. The medium was found swarming with anthrax bacilli on the 19th.
Do...	5	.....	1	1	.....	.....			
Do...									
June 15.	5	.....	1	.....	.....	1	June 17.	Anthrax bacilli.	This bullet went entirely through the basket of cotton, and was found on the ground 6 inches from bottom of basket enveloped in cotton.
June 15.	5	.....	1	.....	.....	1	June 17	Anthrax bacilli.	Same as preceding result.
Do...	5	.....	1	.....	.....	1	....do ...	....do	Ball found in cotton in bottom of basket. The heat of cotton was still perceptible, from recent sterilization, by which wax in end of bullet had been entirely melted.
Do...	5	.....	1	.....	1	.....	....do ...	....do	
Do...	5	.....	1	.....	1	.....	....do ...	....do	Same as last result.
June 17.	5	1	.....	1	.....	.....	June 19.	....do	The bullets in these experiments were recovered direct from the jute.
Do...	5	1	.....	1	.....	.....	....do ...	....do	
Do...	5	1	.....	1	.....	.....	....do ...	....do	
Do...	5	1	.....	1	.....	.....	....do ...	....do	
Do...	5	1	.....	1	.....	.....	....do ...	....do	
Do...	5	1	.....	1	.....	.....	....do ...	....do	

TABLE C.—*Experiments with infected bullets.*

[Organism mixed with a mixture of grease and wax (1 to 4), which was applied to bullet at conica end; used Colt's revolver, caliber .38; organism used to infect bullet, anthrax spores.]

Date.	Range.	Target.	Media used in making cultures from bullets.		Date of observation.	Result.	Remarks.
			Agar.	Gelatin.			
1892.	*Feet.*						
June 19.	13	Iron sterilized.	1	.....	June 21.	Anthrax....	The bullets in these experiments invariably struck the iron target point end first. They were recovered, as a rule, in a number of fragments with sterilized forceps and dropped immediately into the medium.
Do...	13	....do	1	.....	...do	....do	
Do...	13	....do	1	.....	...do	....do	
Do...	13	....do	.....	1	...do	....do	
Do...	13	....do	1	.....	...do	....do	

TABLE D.—*Experiments with infected bullets.*

[Organism placed in concavity of missile next to the powder; used Colt's revolver, caliber .38; organism used to infect bullet, anthrax spores.]

Date.	Range.	Target.	Medium used in making cultures from bullets.	Date of observation.	Result.	Remarks.
1892.	*Feet.*					
June 22.	13	Iron sterilized.	Bouillon	June 25.	Anthrax....	The anthrax spores were placed in the concavity of the bullet with the platinum loop, unmixed with wax and grease.
Do...	13	....do	....do.....	...do	....do	
Do...	13	....do	....do.....	...do	....do	
Do...	13	....do	....do.....	...do	....do	

TABLE E.—*Experiments with infected bullets.*

[Used Colt's revolver, caliber .38; organism used to infect bullet, vegetative form of anthrax.]

Date.	Range.	Target.	Medium used in making cultures from bullets.	Date of observation.	Result.	Remarks.
1892.	*Feet.*					
June 27.	13	Iron sterilized.	Bouillon ..	June 30...	Anthrax....	The bullets in these experiments were infected on the surface at the conical end with a thin paste made from the organs of a mouse that had died of anthrax the night before. The bullets in these experiments were infected in the concavity next to the powder with the material above mentioned.
Do...	13	....do	....do.....	July 1, 2, 3.	No anthrax.	
Do...	13	....do	....do.....	...do	....do	
Do...	13	....do	....do.....	June 30...	Anthrax....	
Do...	13	....do	....do.....	...do	....do	
Do...	13	....do	....do.....	...do	....do	
Do...	13	....do	....do.....	...do	....do	
Do...	13	....do	....do.....	...do	....do	
Do...	13	....do	....do.....	...do	....do	
Do...	13	....do	....do.....	...do	....do	
Do...	13	....do	....do.....	...do	....do	
Do...	13	....do	....do.....	July 1, 2, 3.	No anthrax.	

Examination of tables B, C, D, and E shows that 37 shots were fired into and upon sterilized targets, that the bullets were infected with anthrax germs in different forms, and that the missiles were recovered and dropped into test tubes containing media of various kinds. The column of results shows that 34 out of the 37 bullets recovered were still infected with anthrax germs. The experiments so far demonstrate conclusively, therefore, that anthrax germs in any form, when applied to the projectile of the .38-caliber Colt's revolver, are rarely, if ever, entirely destroyed by the act of firing.

The results as stated induced me to fire anthrax bullets into animals to determine whether or not this might prove to be a source of inoculation.

On July 7, 1892, 2 white rabbits were shot at the Johns Hopkins Pathological Laboratory. The weapon used was a .22-caliber revolver. The projectiles were previously infected by smearing the conical end of the lead with a culture of anthrax germs from a slant of agar-agar which had been prepared from the blood of a gray mouse that had died from the effects of this microörganism the day before.

In the case of the first rabbit the missile passed through the left ear near the skull. The ball penetrated a pine board a few inches beyond, where it was recovered. The animal died July 11, 1892. Cover-slip preparations from the blood stained with a solution of gentian-violet showed anthrax bacilli in abundance. The presence of anthrax was shown by Gram's method in the liver, lung, spleen, and kidneys.

In the case of the second rabbit the ball entered the external surface of the left thigh near the hip joint, and glancing upward lodged under the skin over the sacrum. Although droopy on the fourth day, he made a gradual and complete recovery.

On July 23, 1892, I shot a bull calf 5 weeks old at Fort McHenry at a range of 4 feet. The weapon used in this instance was a .38-caliber double-action Colt's revolver. The bullet was infected by smearing a recent culture of anthrax bacilli upon the conical end. The ball entered the left thigh and lodged in the perineum. The animal sickened on the third day and died July 30. Cover-slip preparations stained with methylene-blue from the blood of the spleen, liver, and heart showed anthrax bacilli.

The experiments with firearms conducted so far give results with but 2 weapons, namely, a .22-caliber 6-chambered revolver and the .38-caliber 6-chambered double-action Colt's revolver. The bullet of the former weighs 29 grains, while the charge of powder weighs 3 grains. The bullet of the .38-caliber Colt's revolver weighs 125 grains. It is fired by 16 grains of powder.

The amount of heat imparted to these projectiles by the act of firing and at the moment of impact must be inconsiderable when compared with that imparted to the .45-caliber projectile of lead belonging to our service rifle, and also to the projectiles of the rifles of small caliber forming the armament of the foot troops of Germany, France, Austria, etc. The last guns mentioned (the Mauser, Lebel, and Mannlicher) may be taken as types of the portable guns with which the wars of the future are to be fought. The projectiles fired from them have a leaden nucleus with an outer covering of steel, nickel or German silver.

On September 2, 1892, the fate of anthrax spores on the projectile of the .45-caliber Springfield rifle was tested as follows:

The full charge of powder—70 grains—was used at a range of 10 feet. Three bullets were infected in grooves made by the pressure of a knife blade upon the conical end of the lead. The bullets were fired into a target of pine boards, each board being an inch thick, disposed at intervals of an inch.

The first bullet penetrated 18, the second 17, and the third 19 boards. Each bullet was recovered with a pair of sterilized forceps and placed in a test tube of bouillon.

Repeated examinations of these tubes after the lapse of forty eight hours failed to show the presence of anthrax bacilli. The shallow grooves in which the anthrax germs were smeared were invariably effaced, while the bullets were very much "set up" by the resistance encountered in the target.

Three more bullets were infected on the same day and fired into the same target.

In this experiment the bullets were infected in the concavity next to the powder. The penetration of the projectiles was 19, 23, and 18 inches, respectively. Each bullet was recovered with a pair of sterilized forceps and dropped in a tube of bouillon.

Examination of the medium after the lapse of forty-eight hours demonstrated the presence of anthrax bacilli in two of the tubes.

Although I had no rifle of small caliber with which to continue my experiments, I was fortunate enough to secure the use of a modified Springfield rifle, which has virtually the same ballistic properties as those of the Mauser, Lebel, and Mannlicher.

The modified Springfield shoots a .30-caliber bullet, weighing 231 grains, made of a leaden nucleus covered by a mantle of either German silver or copper. It is

impressed by 36 grains of smokeless (Wetteren) powder. Its initial velocity is about 2,100 feet per second.

On August 30, 1892, four full-grown white rabbits were shot at Frankford Arsenal with a modified Springfield as follows:

Rabbit No. 1 was shot at a range of 10 feet with a copper-covered bullet infected with anthrax spores at the conical end. The bullet passed through both ears and the intervening scalp. The bullet then penetrated a target of pine boards an inch thick, placed an inch apart. It was recovered in the thirty-fifth board, having penetrated 34 inches of pine.

The bullet was secured with sterilized forceps and dropped into a test tube of bouillon.

The rabbit died from shock, the missile having grazed the skull, two hours after the shooting.

Twelve cover-slips and two agar-agar slants, prepared from the blood in the track of the bullet twenty-four hours after death, failed to show the presence of anthrax; and no anthrax bacilli were ever found in the tube of bouillon containing the bullet.

Rabbit No. 2, like the preceding, was shot with a copper-covered bullet infected with anthrax spores at the conical end. Range, 10 feet.

The bullet passed through both ears, about an inch from the skull, and was recovered between the twenty-eighth and twenty-ninth pine boards with sterilized forceps and placed in bouillon. The bullet was deformed at the conical end—set up—having very likely struck a pine knot in one of the boards.

The rabbit died on September 3, 1892.

Careful search for anthrax failed to demonstrate the presence of the microörganism in either the blood or tissues, nor did it develop in the bouillon containing the bullet.

Rabbit No. 3 was shot at a range of 10 feet with a leaden bullet covered with German silver. The bullet passed through the right ear 2 inches from the scalp. It was recovered from the twenty-first board, and with sterilized forceps placed in bouillon.

The rabbit died on September 3, 1892. Cover-slip preparations from the blood of all the organs, stained with a solution of gentian-violet, demonstrated anthrax bacilli in abundance. The germs were also found in the tissue of the kidney, liver, and heart, by Gram's method.

The bouillon containing the bullet never developed anthrax.

Rabbit No. 4 was shot at a range of 10 feet with a leaden bullet covered with German silver. The bullet passed through both ears near the scalp, and penetrated 43 inches of pine. It was placed in bouillon with sterilized forceps.

The animal died on September 2, 1892.

Anthrax was found in the blood of the heart, and Gram's method revealed its presence in the tissue of the liver, heart, and kidneys.

From the foregoing it appears that only the two rabbits shot with the bullets covered with German silver died of anthrax.

The presence of anthrax could scarcely be expected in the first rabbit shot with a copper bullet, for the reason, as stated, that death was caused by shock only two hours after the injury.

Although the result was negative in the second rabbit shot with a copper bullet, I am very much inclined to believe that further experiments with this projectile would show it to be as capable of transmitting anthrax as the projectile covered with German silver.

The projectile in every instance was placed in tubes of agar-agar, and the latter in turn were converted into rolls. No colonies of anthrax deaveloped in the rolls, which was doubtless due to the great friction encountered in the target of pine boards.

Bullets infected with the streptococcus of erysipelas, with a culture of tetanus, and with the bacillus pyogenes soli of Bolton, were fired through the ears of rabbits with a .45-caliber Colt's revolver. The erysipelas coccus was communicated to one animal, and the bacillus pyogenes soli was recovered from the wound of another; tetanus was not communicated.

A bullet infected with a culture of the bacillus of tetanus was fired into a horse with the modified Springfield rifle with negative results; rabbits inoculated with some of the same culture died promptly. At the suggestion of Prof. Meade Bolton, of the Johns Hopkins Hospital, a bag of tetanus earth was placed against the hip of another horse, and the projectile of the .30-caliber experimental Springfield rifle was fired through the earth into the fleshy part of the ham without result.

Having found that a projectile is not purified by the act of firing, it was considered in the line of our experiments to determine whether or not a projectile can become contaminated in transit after leaving the rifle. It is fair to assume that the old leaden projectile, which deforms so readily in ricochetting, will carry septic matter upon its irregular surface. This proposition was considered so self-evident that no experiments were deemed necessary to prove it. The projectile of the new armament presents different conditions, however. It is made up of a leaden nucleus incased in a hard envelope of either German silver or nickeled steel. In ricochetting, this projectile is not apt to assume an irregular surface, unless it encounters very resistant objects, and when it does deform to any marked extent it is apt to separate into many fragments, a circumstance which must soon end its efficiency.

In order to ascertain whether the hard, polished exterior of the jacketed projectile was apt to carry germs from one point to another in its trajectory, the following experiment was performed at Jackson Park, Chicago, Ill., August 30, 1893. A piece of sheet lint, which, when folded upon itself three times measured 15 by 30 inches, was saturated with a culture of the red water bacillus of Dr. Wilson in beef-tea infusion, and suspended in the air 25 yards from the muzzle of the experimental Springfield rifle. Fifty yards from the target of sheet lint, in direct line with it, was placed a can, 24 inches high, 20 inches wide, and 3 inches deep, filled with sterilized mashed potato. Seven sterilized German silver jacketed projectiles were fired through the lint and potato medium. The orifice of entrance and exit in the latter were plugged at once with sterilized cotton. At the end of forty-eight hours, under favorable conditions of temperature, the red water bacillus failed to develop in the potato. This result shows that the well-polished projectile of hard exterior will not readily carry infection in ricochetting unless it becomes deformed, which it seldom does, and the result, I believe, serves to make the jacketed projectile that much more humane.

The medico-legal phase of this subject of septic bullets is one which deserves attention. As the value of cleanliness and antisepsis becomes better known by the laity, it is only a question of time when surgeons will be held accountable in the courts for inflicting sepsis in wounds. Indeed, such cases may have already arisen. There are two aspects of the practitioner's liability: He may be prosecuted criminally for negligence producing death, or he may be asked civilly to respond in damages by the party injured or by his heirs. For the purposes of this paper, however, the rules of evidence and the burden of proof may be treated as substantially the same.

Speaking thus, with approximate accuracy, if the plaintiff or the prosecution establishes (1) The existence of blood-poisoning, (2) surgical uncleanliness in the use of instruments or dressing, (3) failure on the part of the operator to render his hands or those of his assistants aseptic in the ordinary way, a prima facie case is made against the surgeon, which he must overcome.

Ordinarily he might avail himself of evidence that (1) the patient's clothing, pierced by the bullet, was old and dirty, and hence probably not aseptic, and (2) that his skin at the wound of entrance and exit bore specific germs.

In the light of the results of the foregoing experiments, two additional lines of defense are open to him, viz: (1) The bullet itself might have been septic when fired, and (2) by ricochet, or otherwise in transit, it may have become septic—two conditions, either of which is well within the bounds of possibility.

From the experiments with projectiles I believe we can sum up the following conclusions:

(1) The majority of cartridges in original packages are sterile and free from septic germs.

(2) The sterile condition of cartridges is due to the thorough disinfection and absolute cleanliness observed in the process of manufacture.

(3) The majority of gunshot wounds are aseptic because the vast majority of the projectiles inflicting them are either sterile or free from septic germs.

(4) Anthrax spores or bacilli when applied to the projectile of a portable hand-weapon are seldom if ever entirely destroyed by the act of firing.

(5) When a gunshot wound is inflicted upon a susceptible animal by a projectile infected with anthrax bacilli the animal becomes infected with anthrax and dies, in the vast majority of instances, from said infection.

(6) The streptococcus of erysipelas and the bacillus pyogenes soli when placed upon the projectile of the .45-caliber Colt's revolver are not always, at least, destroyed by the act of firing, and they are liable to cause infection.

(7) Projectiles from portable hand-weapons are not sterilized by the act of firing.

(8) A septic bullet can infect a gunshot wound.

In a partial report to the Surgeon-General, U. S. Army, published in the New York Medical Journal of October 22, 1892, credit was given Profs. William H. Welch and W. T. Councilman for invaluable assistance and advice in the preparation of the foregoing data, and I beg to refer once more to the debt I owe these gentlemen.

The section at 1.45 p. m. took a recess until 2 p. m.

A BRIEF DESCRIPTION OF THE ORGANIZATION AND EQUIPMENT OF A FIELD HOSPITAL, U. S. ARMY.

By Maj. JOHN VAN R. HOFF, surgeon, U. S. Army.

Under existing regulations a field hospital is attached to each military division of the Army. This hospital is divided into 3 brigade sections, and each brigade section is divided into 3 regimental units.

The field hospital presented to the members of the Pan-American Medical Congress for their inspection represents the regimental unit of the divisional field hospital.

The canvas of a regimental field hospital consists of 3 hospital tents with flies and 1 common tent.

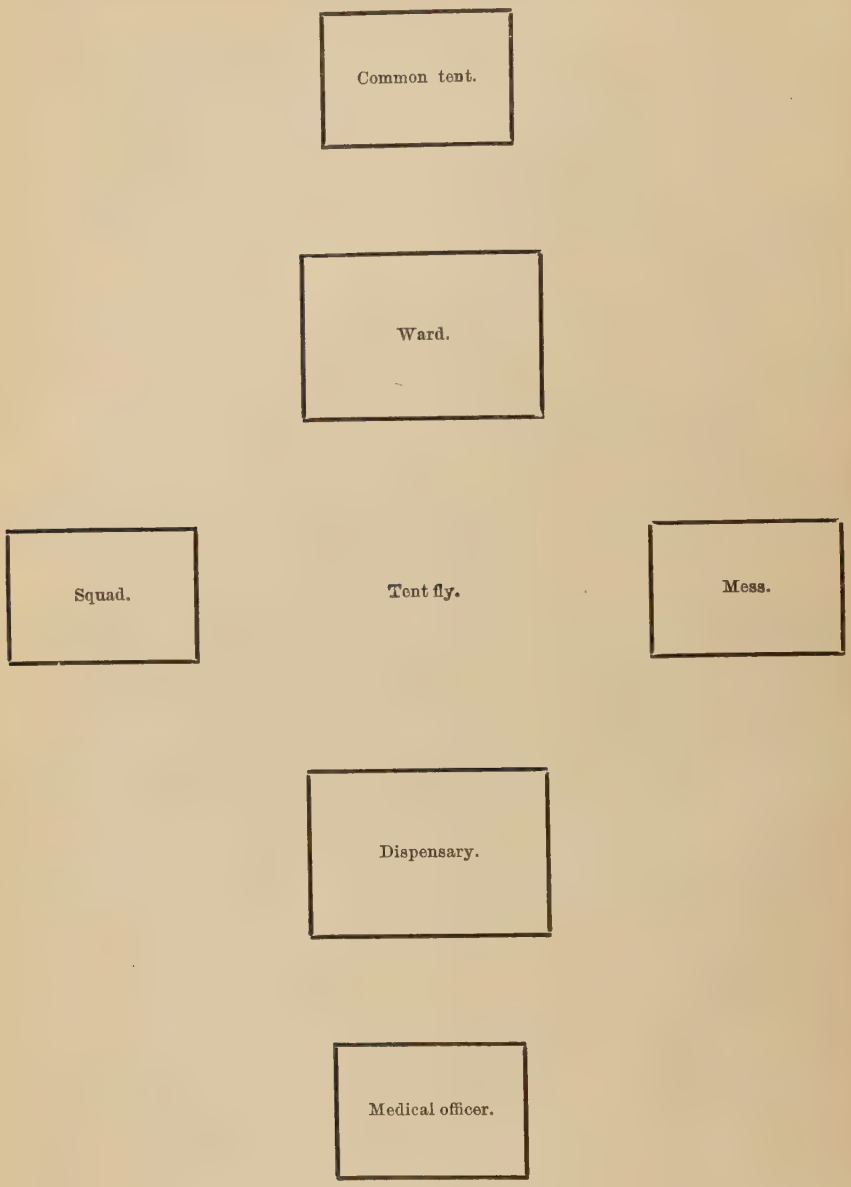
In this particular instance an additional hospital tent was added to be used as a squad tent (which would be the case in permanent camp), instead of the shelter tents ordinarily used by the men of the Hospital Corps in active campaign.

Tentage for medical officers is not included in that for the field hospital. Each medical officer is allowed one wall tent complete.

A hospital tent is 14 feet long, 15 feet wide, and 11 feet to the ridge, the walls being 4½ feet high. It requires to pitch it a ridge and 2 upright poles, and 18 large and 24 small tent pins. This tent furnishes comfortable accommodation for 6 patients, may be made to contain 10, and, with the extended fly, will afford shelter to 20 patients.

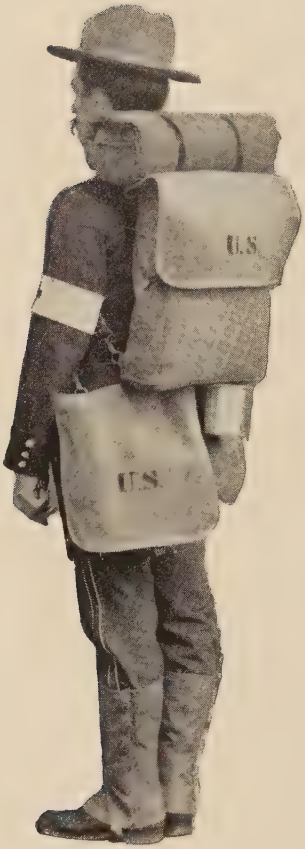
Ordinarily one of the regimental hospital tents is used as a dispensary, another as a ward, and the third as a kitchen and mess tent. The common tent will generally be used as a "sink" cover.

It has been found most convenient in practice to pitch the tents cross shaped, as follows:



REGIMENTAL FIELD HOSPITAL, U. S. ARMY, PRESENTED FOR THE INSPECTION OF THE PAN-AMERICAN MEDICAL CONGRESS, 1893.

1. Medical officer's tent.
2. Dispensary tent.
3. Hospital tent fly.
4. Ward tent.
5. Mess and cook tent.
6. Squad tent.
7. Ambulance wagon.
8. Hospital Corps detachment.



Private, Hospital Corps. Field equipment (rear view).

MEDICAL DEPARTMENT, U. S. ARMY.

This was the plan adopted with the model hospital, as shown in the illustration:

The materials entering into the formation of the hospital were obtained by requisition upon several staff departments of the Army, and were as follows:

MATERIAL REQUIRED FOR REGIMENTAL FIELD HOSPITAL.

[From the Surgeon-General, U. S. Army.]

6 folding field cots.
6 folding chairs.
3 folding tables, bedside.
2 folding tables, mess.
2 folding chairs, arm.
6 blankets, gray.
6 bedsacks.
6 pillowticks.
12 pillowcases, cotton.
2 blanket cases, canvas.
6 mosquito bars.
6 shirts, cotton.
6 drawers, cotton.
1 blanket, India rubber.
12 towels, hand.
1 medical chest and canvas cover.
1 surgical chest and canvas cover.
1 mess chest.
1 food chest.
1 reserve chest.
1 commode set.
1 field desk, new pattern (complete with blanks, etc.).
1 pack saddle.
4 buckets, galvanzed iron.
3 hand litters, new pattern (complete with slings).
1 surgeon's field case.
1 medical officer's orderly pouch.

[From the Quartermaster-General, U. S. Army.]

4 hospital tents, 8 upright poles (2 with extra long pins), 5 ridge poles, tent pins (large and small).
5 hospital-tent flies, 8 long guys.
1 common tent (closed corners), 4 upright poles, 1 ridge pole, tent pins.
1 wall tent, 3 upright poles, 2 ridge poles, tent pins (large and small).
1 wall-tent fly.
1 field-hospital flag.
1 flag pole, jointed, 16 feet long, with halyards.
5 Sibley tent stoves.
15 joints Sibly tent stovepipe.
1 pickax.
1 pickax helve.
1 spade.
4 mauls.
1 ambulance, new pattern, complete.
1 ambulance guidon.
1 travois, new pattern.
1 ax.
1 ax helve.

[From the Commissary-General, U. S. Army.]

1 Dutch oven.
1 Buzzacott's oven.

In connection with the sanitary organization of a division of the Army (which is the fighting unit), it has been found that in the event of the more or less permanent detachment of a regiment a Hospital Corps detail of 2 non-commissioned officers and 8 privates will be required to man the regimental field hospital.

It is, of course, understood that these men are directly under the command of the senior medical officer attached to the regiment and that they bear the same relation to him as is borne by other enlisted men to their immediate commanders. This relation, while it greatly adds to the efficiency of the military sanitary organization, entails considerable additional work upon the medical officer—all of the work, indeed, performed by the company commander beside the strictly professional work pertaining to his office.

The military equipment of the Hospital Corps is supplied by the Ordnance Department and consists of—

Blanket bag.
Blanket bag shoulder straps, pair.
Blanket bag coat straps.
Canteen.
Canteen strap.
Cup, tin.
Fork.
Haversack.
Hversack strap.
Knife.
Knife, Hospital Corps.
Knife, Hospital Corps, scabbard.

Meat can.
Revolver.*
Rifle, Springfield, muzzle loading.†
Shotgun, Springfield.‡
Shotgun, reloading outfit.§
Spoon.
Sword belt for hospital steward.
Sword-belt plate for hospital steward.
Sword frog for belt.
Waist belt.
Waist-belt plate.

The technical equipment consists of a waterproof canvas pouch issued to each private soldier, and containing as follows:

Ammonia, aromatic spirits, *exp*	ounces	1
Bandages, roller, *exp*	number	4
Candle, in tin box, *exp*	do	1
First-aid packet, *exp*	do	1
Forceps, dressing‖	do	1
Iodoform sprinkler	do	1
Jackknife	do	1
Lint, sublimated, *exp*	ounces	2
Needles, medium, *exp.*‖	papers	1
Petrolatum, carbolized, *exp*	ounces	½
Pins, common, *exp.*‖	papers	1
Pins, safety, *exp.*‖	number	6
Plaster, adhesive, *exp*	spools	1
Scissors, medium‖	number	1
Splints, wire	do	2
Sponges, small, in bag, *exp*	do	2
Thread, linen, *exp*‖	yards	20
Tourniquets, field	number	2
Wool, boracic, *exp*	ounces	2

A first-aid packet is issued to each noncommissioned officer; this packet contains 2 antiseptic compresses of sublimated gauze in oiled paper; 1 antiseptic bandage of sublimated cambric, with safety pin; 1 Esmarch's triangular bandage, with safety pin (mode of application illustrated on same).

The special equipment of the medical officer, which he himself carries, consists of a field case in mahogany case, with leather pouch, containing:

Bistoury, curved	number	1
Bistoury, curved, probe-pointed	do	1
Bistoury, straight	do	2
Catheters, silver, Nos. 3, 6, and 9	do	3
Catling, long	do	1
Catling, medium	do	1
Director	do	1
Elevator	do	1
Elevator and raspatory, combined	do	1
Forceps, artery, spring	do	1
Forceps, bone, curved	do	1
Forceps, bullet	do	1
Forceps, dissecting	do	1
Forceps, dressing	do	1
Forceps, sequestrum	do	1
Knife, amputating, long	do	1
Knife, amputating, medium	do	1
Knife, hernia	do	1
Ligature silk, *exp*	cards	4
Needle, aneurism, handle and 3 tips, number		1
Needle, key, artery	do	1
Needles, surgeons', *exp*	do	12
Needles, wire, suture, *exp*	number	6
Probe, bullet, long	do	1
Probe (Nélaton's)	do	1
Razor	do	1
Retractors	do	2
Saw, bow, 2 blades	do	1
Saw, chain	do	1
Saw, Hey's	do	1
Saw, metacarpal	do	1
Scalpel	do	1
Scissors, angular	do	1
Scissors, straight	do	1
Sounds, steel, silvered, double curve, Nos. 1–2, 3–4, 5–6, 7–8, 9–10, 11–12	number	6
Tenaculum	do	1
Tourniquet, screw, with pad	do	1
Trephine, brush for	do	1
Trephine, conical, and handle	do	1
Trocar and cannula, curved	do	1
Wax, *exp*	pieces	1
Wire suture, silver, *exp*	loops	3

* Revolvers will be obtained from the post commander for service in an Indian country, when necessary. If it is impracticable to obtain them for temporary service in this way, they may be procured by requisition on the Chief Ordnance Officer of the Department. Circular S. G. O., April 30, 1891.

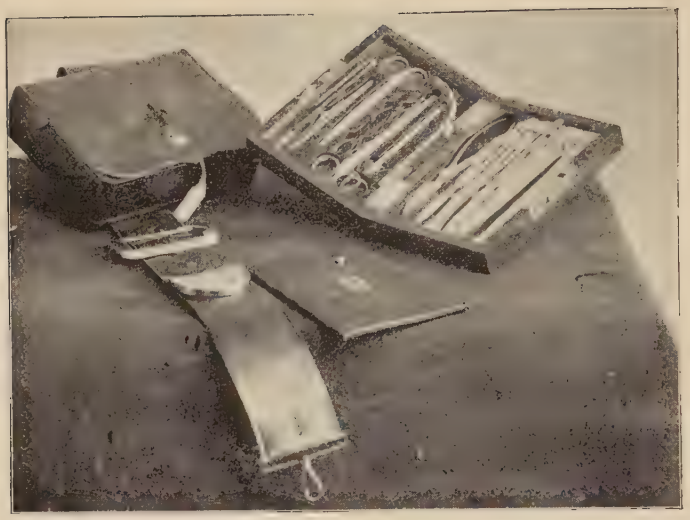
† The issue of two Springfield muzzle-loading rifles to each military post for company bearers' drill is authorized. Decision Acting Secretary of War, 1888.

‡ "Upon requisition of the post surgeon (through the usual military channels), duly approved by the Surgeon-General, the Ordnance Department will issue, for use at posts west of the Mississippi River, a shotgun with necessary appendages and ammunition for the use of members of the Hospital Corps." Decision Chief of Ordnance, 1889.

§ The reloading outfit of the shotgun consists of the following. The articles with * prefixed are expendable, and may be replaced by annual requisitions upon the Chief Ordnance Officer of the Department.

Brush wiper	number	1
Canister, tin, for powder, 2 pounds	do	1
Canister, tin, for powder, 5 pounds	do	1
*Cartridge primers	do	1,000
*Cartridge shells, 20 gauge	do	50
Charger, adjustable	do	1
*Cotton cloth	yard	1
*Cotton waste	pounds	1½
Drift	number	1
Funnel	do	1
*Gun wads, No. 18, pink edge	do	2,000
Packing box	do	1
*Powder, musket	pounds	7
Priming tool (Frankford)	number	1
*Shot, No. 8	pounds	50

‖ Articles marked thus are contained in special case.



Field case.

Private, Hospital Corps. Full uniform (rear view).

Medical chest. (Dimensions, 22¾ by 11¼ inches by 16 inches; weight, 102 pounds.)

Also an orderly pouch, carried by his orderly, containing:

Ammonia, aromatic spirits, *exp*	ounces	1	
Bandages, roller, *exp*	number	2	
Basin, pus	do	1	
Case, medicine, with tablets[1]	do	1	
Catheter, elastic (No. 8), *exp*	do	1	
Chloroform, *exp*	ounces	4	
First-aid packet, *exp*	number	1	
Glass, medicine, *exp*	do	1	
Lint, sublimated, *exp*	ounces	2	
Petrolatum, carbolized, *exp*	ounces	½	
Pins, common, *exp*	papers	1	
Pins, safety, *exp*	number	6	
Scissors, medium	do	1	
Sponges, small, in bag, *exp*	do	2	
Syringes, hypodermic, with tablets	do	1	
Tags, diagnosis, *exp.*, with pencil	books	1	
Tourniquet, Esmarch	number	1	
Wool, boracic, *exp*	ounces	2	

Each regimental unit of the divisional field hospital is equipped with chests as follows, viz:

The contents of the medical and surgical chests are expendable, with the exception of those to which an asterisk is prefixed. A list of contents is stamped on morocco pad, which is carried, reversed, under the cover of chest.

No. 1.—*Medical chest.*

CONTENTS OF TRAY.

Left of tray (4-ounce bottles):		
Acetanilid (tablets)	grains	3
Camphor and opium (tablets)		
Cathartic compound (tablets)		
Cathartic compound, vegetable (tablets)		
Copaiba compound (tablets)		
Cough (tablets)		
Diarrhea (tablets)		
Dover's powder (tablets)	grains	5
Liniment (tablets)	do	20
Potassium bromide (tablets)	do	10
Quinine sulphate (tablets)	do	3
Sodium bicarbonate (tablets)	do	5
Sodium salicylate (tablets)	do	5
Magnesium sulphate	ounces	4
And two empty bottles.		
Front of tray—(half-ounce bottles):		
Acid arsenious (tablets)	grains	$\frac{1}{40}$
Alterative (tablets)		
Capsicum (tablets)	grains	$\frac{1}{2}$
Colchicum, fluid extract (tablets)	minims	$\frac{1}{2}$
Croton oil (tablets)	do	$\frac{1}{10}$
Ergotin (tablets)	grains	2
Iodine	ounces	$\frac{1}{2}$
Nitroglycerin (tablets)	grains	$\frac{1}{100}$
Podophyllin (tablets)	do	$\frac{1}{2}$
Santonin (tablets)	do	$\frac{1}{2}$
Silver nitrate, fused	ounces	$\frac{1}{8}$
Tincture digitalis (tablets)	minims	5
Tonic (tablets)		
Back of tray (8 and 16 ounce bottles):		
Alcohol	ounces	16
Ammonia, stronger water	do	8
Brandy	do	16
Chloroform	do	8
Ether	do	16
Back of tray—Continued.		
Oil, castor	ounces	8
Turpentine	do	8
Whisky	do	16
Stoppers, rubber, for above	number	10
Center of tray:		
Cotton wool	quantity sufficient	
Envelopes, small, for tablets	number	100
Graduates, glass, 2-ounce	do	1
Graduates, glass, minim	do	1
Labels, for vials	do	50
Links, split, for pack saddle*	do	4
Ointment boxes, in nests of three	nests	4
Pocket stove*	number	1
Vials, 2-ounce	do	10
Right of tray (2-ounce bottles):		
Acid boracic (tablets)	grains	5
Acid tannic (tablets)	do	5
Alum (tablets)	do	5
Ammonium chloride (tablets)	do	5
Antipyrin (tablets)	do	5
Bismuth subnitrate (tablets)	do	5
Blue mass (tablets)	do	5
Calomel (tablets)	do	2
Chloral (tablets)	do	5
Ipecac (tablets)	do	1
Lead acetate (tablets)	do	3
Morphine sulphate (tablets)	do	$\frac{1}{4}$
Opium (tablets)	do	1
Peptic (tablets)		
Phenacetin (tablets)	grains	5
Potassium chlorate (tablets)	do	5
Potassium iodide (tablets)	do	5
Salol (tablets)	do	5
Tincture aconite root (tablets)	minims	2
Zinc sulphate (tablets)	grains	5

CONTENTS OF DRAWERS.

Drawer No. 1.		
Hypodermic tablets:[2]		
Apomorphine hydrochlorate, gr. $\frac{1}{10}$, bottles		1
Atropine sulphate, gr. $\frac{1}{100}$	bottles	1
Cocaine hydrochlorate, gr. $\frac{1}{8}$	do	1
Ergotin, gr. $\frac{1}{10}$	do	1
Morphine sulphate, gr. $\frac{1}{8}$	do	1
Pilocarpine hydrochlorate, gr. $\frac{1}{6}$	do	1
Quinine bimuriate, gr. $\frac{1}{2}$	do	1
Strychnine sulphate, gr. $\frac{1}{30}$	do	1

Drawer No. 1—Continued.		
Ophthalmic discs.		
Atropine sulphate, gr. $\frac{1}{100}$, 50 in box	box	1
Eserine sulphate, gr. $\frac{1}{2000}$, 50 in box	do	1
Miscellaneous:		
Caustic holder, rubber*	number	1
Corkscrew, folding*	do	1
Medicine droppers	do	2
Pencil, indelible*	do	1
Pencil, indelible, leads for	do	6
Pencils, camel's-hair	do	12

[1] The six half-ounce bottles in this case contain the following tablets:

Acetanilid	grains	3
Antiseptic		
Compound cathartic		
Cough		
Diarrhœa		
Quinine	grains	8

[2] The contents of tubes of hypodermic tablets hereafter issued to replace those expended should be placed in the screw-cap bottles.

CONTENTS OF DRAWERS—Continued.

Drawer No. 1—Continued.

Miscellaneous—Continued.		
Syringe, hypodermic*	number..	1
Thermometer, clinical	do....	1
Tongue depressor	do....	1

Drawer No. 2.

Bandages, suspensory	number..	5
Flannel, red	yards..	1
Jute, salicylated, in ¼-lb. pkgs	packages..	4
Syringe, rubber, self-injecting*	number..	1

Drawer No. 3.

Book, prescription	number..	1
Forceps, dressing[1]*	do....	1
Index of medicine (Carpenter)*	copies..	1
Plaster, blistering	yards..	1
Plaster, mustard	do....	4
Reagent case*[2]	number..	1
Scissors*	do....	1
Spatula*	do....	1
Spoon, tea	do....	1
Stethoscope, h. r.*	do....	1
Syringes, p. g., in wooden case	do....	3
Syringes, p., h. r	do....	5

Drawer No. 3—Continued.

Tags, diagnosis, 24 in book	books..	1
Towels*	number..	2

Drawer No. 4.

Beef extract, in 4-oz. cans	pounds..	1
Jute, salicylated, ¼-lb. pkgs	packages..	6

Drawer No. 5.

Bandages, roller, assorted	number..	30
Cotton, absorbent, ¼-lb. pkgs	packages..	4
Soap, castile	ounces..	8

Drawer No. 6.

Candles	number..	18
Flaxseed meal	pounds..	2

Drawer No. 7.

Cupping tins*	number..	4
Gauze, sublimated, 1-yard	packages..	3
Lint, absorbent, ¼-lb. packages*	do....	4

No. 2.—*Surgical chest.*

CONTENTS OF TRAY.

4-ounce bottles.		
Acid, boracic, tablets, gr. 5	bottle..	1
Antiseptic, tablets	bottles..	2
Compound cathartic, tablets	do....	1
Opium, tablets, gr. 1	do....	1
Potassium bromide, tablets, gr. 10	do....	1
Bucket, folding, canvas*	number..	1
Catheters, flexible*	do....	6
Dressing paper	roll..	1
Ether	pound..	1
Felt for splints	pieces..	2
Links split for pack saddle	number..	4
Muslin	yards..	3
8-ounce bottles:		
Carbolic acid, pure	bottles..	1
Chloroform	do....	2
Glycerin	do....	1
Laudanum	do....	1
Whisky	do....	2
Stoppers, rubber, for above	number..	10
Petrolatum	pound..	1
Pocket case, aseptic*	number..	1
Pus basin*	do....	1
Razor*	do....	1
Razor strop*	do....	1
Towels*	do....	2

Drawer No. 1.

Bandage, rubber	number..	1
Brush, nail	do....	1
Gauze, sublimated	yards..	2
Goggles	number..	2
Iodoform sprinkler*	do....	1
Ligature, catgut, carbolized	spools..	3
Ligature, silk	cards..	5
Needles, thread, etc., in case	cases..	1
Pencil, indelible, lead for	number..	3
Pins, common	paper..	1
Pins, safety, assorted	dozen..	4
Plaster, isinglass	yards..	10
Speculum for ear and nose*	number..	1
Tape	piece..	1
Tape measure*	number..	1

Drawer No. 1—Continued.

8-ounce bottles—Continued.		
Tourniquet, Esmarch's*	number..	1

Drawer No. 2.

Case, tooth-extracting*§	number..	1
Cotton, absorbent	packages..	2
Drainage tubes, rubber	yards..	3
Plaster, adhesive, 1-inch	spools..	4
Plaster, adhesive, 2-inch	do....	1
Sponges, in bags	bags..	2
Syringe, fountain*	number..	1

Drawer No. 3.

Bandages, suspensory	number..	2
Beef extract, in 4-ounce cans	cans..	1
Brush, shaving*	number..	1
Cotton, absorbent	packages..	2
Medicine-measuring glass	number..	1
Minim measuring glass	do....	1
Needle, sail	do....	1
Needle, upholsterer's	do....	1
Pencil, indelible*	do....	1
Scissors*	do....	1
Surgery, operative*	copies..	1
Syringe, p. h. r	number..	1
Tags, diagnosis, 24 in book	book..	2
Tool, universal*	number..	1

Drawer No. 4.

Bandages, flannel	number..	4
Bandages, roller	do....	6
Emergency case, complete*	do....	1

Drawer No. 5.

Gauze, sublimated	yards..	4
Jute, salicylated, in ¼-lb. packages	pkgs..	6
Lantern, small*	number..	1
Soap, castile	ounces..	8

Drawer No. 6.

Bandages, roller, assorted	dozen..	4

[1] For the convenient removal of cotton from tablet bottles.

[2] Consisting of—

Acid, citric	tubes..	1
Dropper, medicine	number..	1
Paper, litmus, blue	slips..	6
Potassium ferrocyanide	tubes..	1
Sugar test powder	tubes..	1
Test tube	number..	1
Urinometer*	do....	1

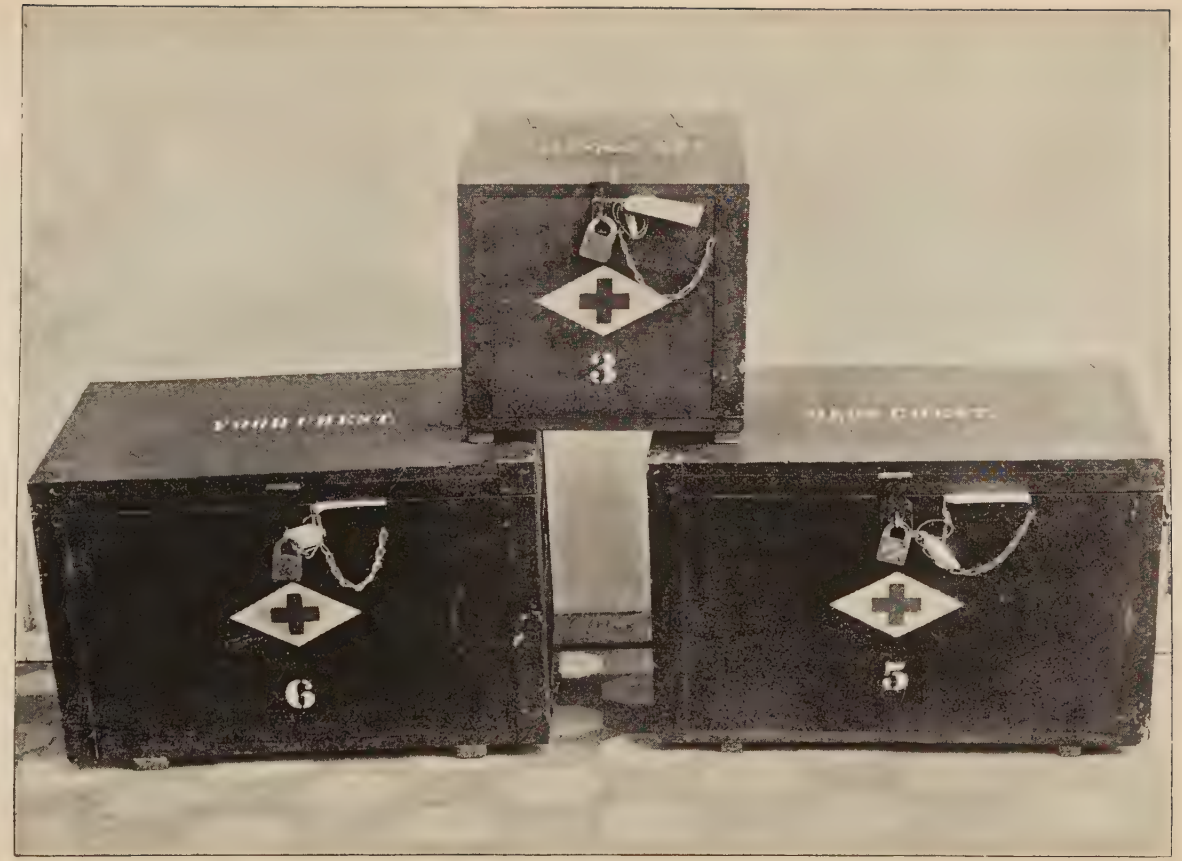
With circular of directions.

§ This tooth-extracting case consists of—

Case, leather, rolling	number..	1
Lancet, gum	do....	1
Elevator	do....	1
Forceps, "half-curved root"	number..	1
Forceps, "lower wisdom"	do....	1
Forceps, "wisdom"	do....	1

No. 2 surgical chest. (Dimensions, 22¾ by 11¾ inches by 16 inches; weight, 92 pounds.)

Emergency case.



MEDICAL DEPARTMENT, U. S. ARMY.

Pack saddle and medical and surgical chests in position.

The "emergency case" carried in the surgical chest contains a sufficient variety of compressed medicines to meet the ordinary requirements of a company, or even two companies on detached service from the regiment for a few days. It contains:

Tablets in half-ounce bottles:		
Acetanilid	grains	3
Acid, boracic	do	5
Acid, tannic	do	5
Alum	do	5
Ammonium chloride	do	5
Antipyrine	do	5
Calomel	do	2
Camphor, grains 2, and opium grain 1		1
Cathartic compound		1
Colchicum, fluid extract	minim	$\frac{1}{2}$
Cough		*
Diarrhœa		1
Dover's powder	grains	5
Ergotin	do	2
Ipecac	grain	1
Morphine, sulphate	do	$\frac{1}{8}$
Nitroglycerin	do	$\frac{1}{100}$
Opium	do	1
Phenacetin	grains	5
Potassium, bromide	do	10
Potassium chlorate	grains	5
Quinine sulphate	do	3
Sodium salicylate	do	5
Sulphonal	do	5
Tincture aconite root	minims	2
Tincture digitalis	do	5
Tablets, hypodermic, in tubes:		
Apomorphine hydrochlorate[1]	grain	$\frac{1}{10}$
Atropine sulphate	do	$\frac{1}{100}$
Cocaine hydrochlorate	do	$\frac{1}{8}$
Digitalin	do	$\frac{1}{100}$
Ergotin[1]	do	$\frac{1}{10}$
Morphine sulphate[1]	do	$\frac{1}{8}$
⟨ Morphine sulphate[1]	do	$\frac{1}{8}$
⟩ Atropine sulphate[1]	do	$\frac{1}{100}$
Pilocarpine hydrochlorate	do	$\frac{1}{8}$
Quinine bimuriate	do	$\frac{1}{8}$
Strychnine sulphate	do	$\frac{1}{60}$
Syringe, hypodermic	number	1
Thermometer, clinical	do	1

No. 3.—*Commode set, dimensions 17 by 18 by 16 inches.*

Bed pan, agate ware	number	1
Chamber pot, agate ware	do	1
Paper, toilet, *exp*	packages	6
Spit cup, agate ware	number	1
Urinal, agate ware	do	1

No. 4.—*Field desk.*

Books:		
Army Regulations	copy	1
Epitome of Tripler's Manual, Greenleaf's, copy		1
Handbook for the Hospital Corps, Smart, copy		1
Information slip book	copy	1
Manual of Drill of Hospital Corps	do	1
Morning Report, Hospital Corps	do	1
Morning Report, sick and wounded	do	
Order and letter book	do	1
Standard Supply Table	do	
Transfer book	do	1
Stationery:		
Book, blank, 8mo	number	1
Elastic bands, assorted	gross	$\frac{1}{2}$
Envelopes, official, large	number	12
Envelopes, official, letter	do	50
Envelopes, official, note	do	25
Eraser, steel	do	1
Ink, black	bottles	2
Ink, red	bottle	1
Inkstands	number	2
Mailing tubes	do	4
Pads, prescription	do	4
Paper, blotting	sheets	4
Paper-fasteners	number	12
Paper, writing, legal cap	quire	1
Paper, writing, letter	quires	2
Paper, writing, note	quire	1
Pencils, lead	number	4
Pens, steel	do	12
Penholders	do	2
Portfolio for medical department blanks, number		1

Blanks.

Medical Department:		
Examination of recruits, monthly report, number		4
Hospital fund, statement	number	4
Medical property, return of	do	2

Blanks—Continued.

Medical Department—Continued.		
Medical supplies, invoice of, single sheet, number		6
Medical supplies, receipt for, single sheet, number		6
Medical supplies, special requisition for, number		8
Report of sick and wounded	number	12
Report of completed cases	do	12
Return of personnel, etc., H. C	do	6
Quartermaster's Department:		
Clothing and equipage, quarterly return of	number	2
Clothing and equipage, requisitions for, number		4
Fuel, forage, and straw, requisitions for, number		4
Invoices, abstract "E"	number	2
Receipts, abstract "E"	do	2
Requisitions, special (No. 48)	do	6
Stores, quarterly return of	do	2
Subsistence Department:		
Ration returns	number	12
Ordnance Department:		
Invoices	number	2
Quarterly statements	do	2
Receipts	do	2
Adjutant-General's Department:		
Certificates of disability	number	2
Descriptive lists	do	2
Discharges	do	2
Final statements	do	4
Furloughs	do	2
Inventory of effects of deceased soldiers, number		2
Muster and pay rolls, hospital	number	8
Outline figure cards	do	6
Physical examination of recruits, form for	number	6
Surgeon's certificate of disability for officers	number	2

[1] Tablets marked thus are in the hypodermic syringe case.

No. 5.—*Mess chest.*

[Dimensions, 30 by 17¾ by 20 inches.]

Basin, wash-hand, agate ware	number	1	Matches, in waterproof case, *exp*	boxes	12
Boilers, double, agate ware	do	1	Meat-cutter, small	number	1
Bowls, soup, agate ware	do	6	Meat dishes, agate ware	do	2
Box for salt	do	1	Mill, coffee	do	1
Box for pepper	do	1	Nails, assorted, *exp*	pounds	4
Brush, scrubbing, *exp*	do	1	Pan, frying, steel	number	1
Can-openers, *exp*	do	2	Pans, mess, agate ware	do	2
Cleaver	do	1	Pans, sauce, steel, tinned inside, with cover, number		1
Cookbook, Army	do	1	Plates, dinner, agate ware	number	6
Cups, coffee, agate ware	do	6	Pot, coffee, agate ware	do	1
Cups, large, agate ware	do	1	Pot, tea, agate ware	do	1
Dippers, agate ware	do	1	Rope, ¼-inch, *exp*	feet	50
Graters, nutmeg	do	1	Sickle	number	1
Gridiron	do	1	Spoons, basting, agate ware	do	1
Hatchet	do	1	Spoons, table	do	6
Kettles, steel, nested, with covers	do	3	Spoons, tea	do	6
Knife, butcher	do	1	Steel	do	1
Knife and fork, carving, of each	do	1	Towels, crash	do	6
Knife and saw, combined	do	1	Tray, metal, japanned	do	1
Knives and forks, of each	do	6	Tumblers, agate ware	do	6
Ladles, agate ware	do	1	Wire, *exp*	coil	1
Lantern, candle	do	1			

No. 6.—*Food chest.*

[Dimensions, 30 by 17¾ by 20 inches.]

Beef extract or an equivalent preparation.
Candles.
Condensed milk, in original cans, 8 pounds.
Soap.
Vinegar, in 1-quart wicker-covered bottles, 2 bottles.
Yeast powder, in one-half pound original cans.

Tins for the following-named articles:
Beans.
Butter.
Coffee.
Salt and pepper.
Sugar (2 tins).
Tea.

Considerable vacant space is left in this chest to allow latitude to each medical officer as to the character of the supplies he may wish to carry or can obtain.

No. 7. Reserve chest.—Contains an additional supply of material to replenish that used from the professional chests.

The medical and surgical chests are ordinarily carried in the box of the ambulance wagon; they are also arranged to be carried on the back of an animal if the character of the country should preclude the use of the wheel transportation. Pack saddles are issued by the Medical Department for this purpose.

The travois is furnished to transport wounded where wagons can not be taken.

It consists of a frame, having 2 shafts, 2 side poles, and 2 crossbars (fig. —), upon which a regulation litter may be rested and partly suspended. When in use a horse or mule is attached to the shafts and pulls the vehicle, the poles of which drag on the ground. One pole is slightly shorter than the other, in order that in passing an obstacle the shock may be received successively by each pole and the motion equably distributed over the entire structure.

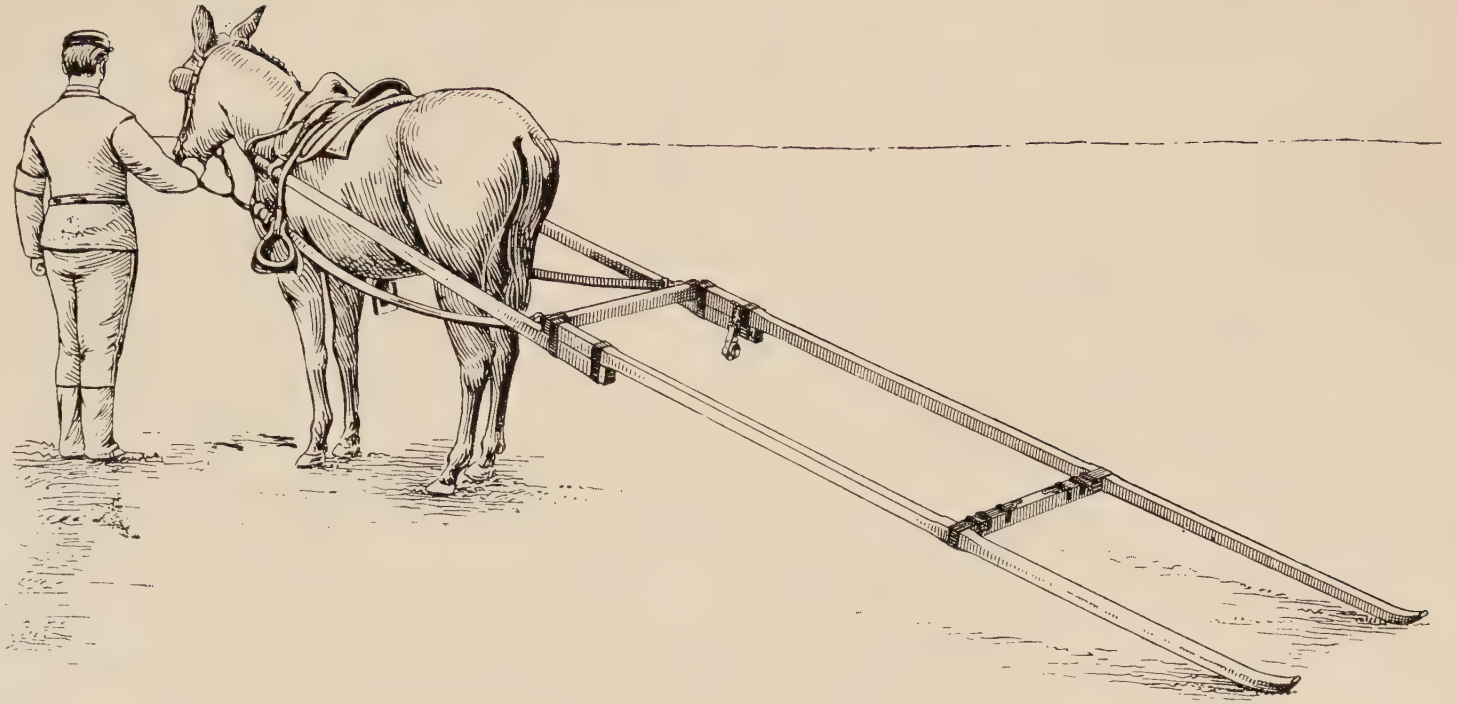
To assemble the travois:

(1) Pass the shafts through the collars on the side pole from the rear to the front, pulling them until they are snugly "home."

(2) Pass the front crossbar over the iron ends on the front of the side pole, driving it smartly "home" until its collars strike the front collar of the side pole.

(3) Pass the rear crossbar (keeping uppermost the surface on which are the flat bolts) over the rear ends of the side poles, pushing it forward until it reaches the squared points on the side poles intended for its place and passes the bolt slot on the side of the pole. Having passed this point, throw the barrel bolts into place.

To place a litter on the travois, throw the flat bolts on the rear travois bar back so that they leave the mortises free; set the litter legs into these mortises (keeping the litter poles parallel with side poles) and throw the bolts so that the litter legs are securely fastened to the crossbar; then pass the leather loops on the front end of the side pole over the front handles of the litter pole.



Travois.

Ambulance, pattern of 1892.

MEDICAL DEPARTMENT, U. S. ARMY.

Front View.

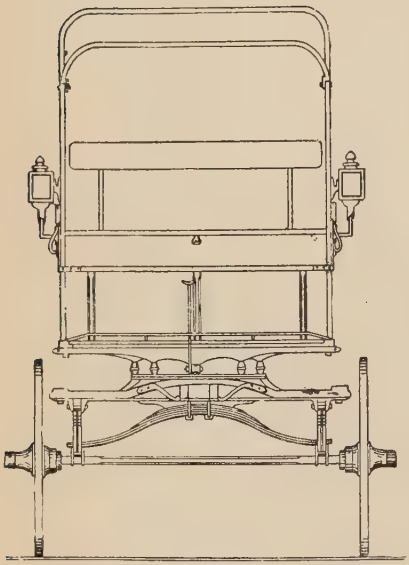


Fig. 2.

Back View.

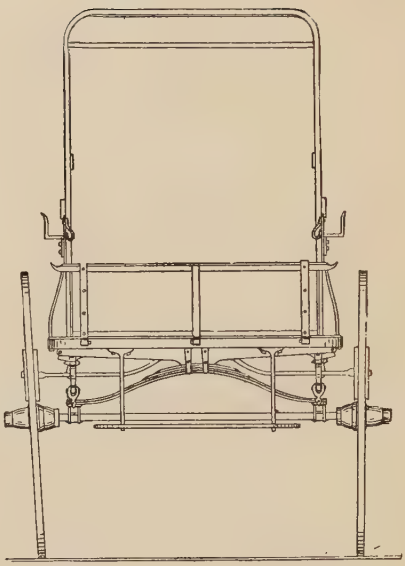
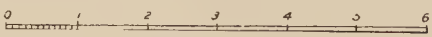


Fig. 3.

SCALE.



Ambulance of 1892 pattern.

MEDICAL DEPARTMENT, U. S. ARMY.

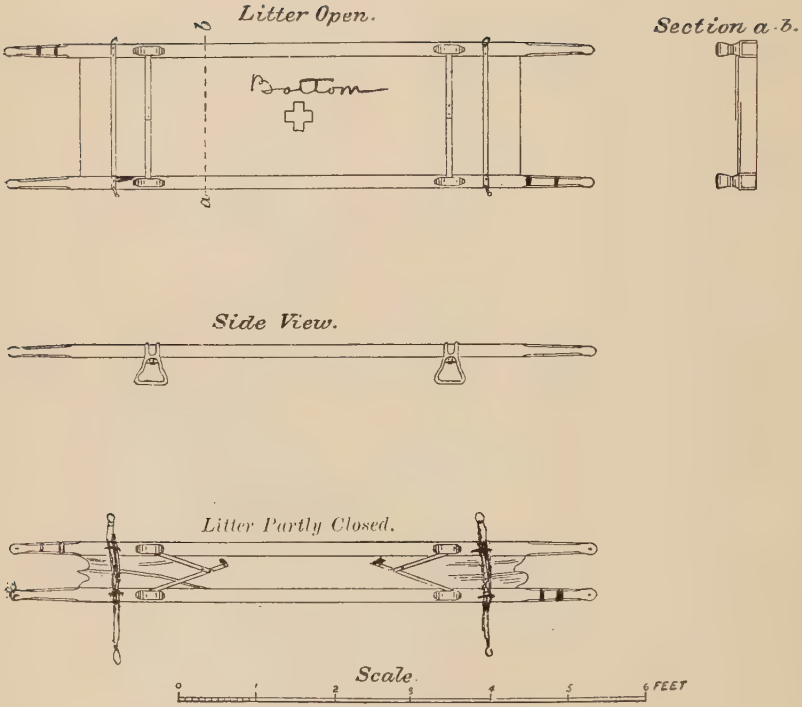


FIG. 4.—Regulation hand litter, 1893.

To harness the travois, place the animal between the shafts, and, if he has on an ordinary wagon harness, put the rings that are on the front end of the shafts over the iron hook on the hames, and fasten the toggle of the trace chains to the ring on the side pole.

If the animal is saddled, after placing him between the shafts fasten the ring that is on the front of the shafts to the rings on the pommel of the saddle by means of the straps that belong there, and secure the shafts by a surcingle passed over all.

To pack the travois, reverse the movements required to assemble the travois and separate each from its fellow; lay 1 shaft, 1 side pole, and 1 crossbar together, the front end of the shaft resting in the collar irons of the side pole, and secure them by the two leather straps furnished for that purpose; the entire travois is then in two bundles, which are to be carried in a wagon with tentage, etc.

It is believed that this simple contrivance perfected by Lieut. Col. Charles R. Greenleaf, Deputy Surgeon-General, U. S. Army, will be of great use in future wars in removing the wounded from the battlefield. In this sliding litter the horse takes the place of 2 human bearers and, so far as strength and endurance are concerned, does the work of 8 men.

The regulation hand litter of the U. S. Army, constructed in accordance with a model submitted by Maj. John Van R. Hoff, surgeon, U. S. Army, consists of a canvas bed 6 feet long by 22 inches wide, made fast to 2 ash poles 7½ feet long and stretched by 2 jointed cross braces. The ends of the poles form the handles, 9 inches long, by which the litter is carried. The fixed iron legs, to which are attached the cross braces, are stirrup shaped 4 inches high and 1¾ inches wide. On the left-front and right-rear handles a half-round iron ring is fixed, 4½ inches from the end; between this and the canvas plays the movable ring of the sling. The cross-straps, each with a ring at one end and a snap at the other, play through staples fastened to the bottom of each pole at either end beneath the canvas, and near its free edges. When the litter is closed they are passed around it through the free loops of the slings and the rings are fastened to the snaps, thus securely closing the litter.

One pair of regulation slings is permanently attached to each litter. They are made of gray woolen webbing 2½ inches wide, with a leather-lined loop at one end and a leather strap (with a buckle and swivel snap) at the other; the snap is attached to the eye in the movable ring.

This litter weighs 22 pounds complete; two of them will fit into the new pattern ambulance, and one can be suspended upon the travois; it may, if necessary, be used as a bed, or under any and all conditions in which such an appliance is indicated.

The regulation ambulance wagon is a 4-wheeled 2-horse vehicle; it provides transportation for 8 patients sitting or 2 recumbent on litters; or 4 sitting and 1 recumbent.

The dimensions of the body are 9 feet 3 inches long, 4 feet 2 inches wide, 5 feet 3½ inches high over all, 7 feet 8 inches long back of driver's seat, 3 feet 11 inches wide, 5 feet ½-inch high in the clear inside. The body hangs 3 feet 4 inches from the ground. The framework of the body is of white oak. The forewheels traverse the body of the wagon and permit the vehicle to make abrupt turns, or to turn "on its own ground," while the diameter of the forewheels has not been diminished so as to interfere seriously with the traction of the wagon. The driver's box is 18¼ inches deep, 15 inches wide, and 3 feet 11 inches long. A drawer or tool box, 19¾ inches long, 7⅜ inches wide, and 3⅜ inches deep, slides under the near side of toeboard. Two silver-plated candle lamps are secured, one on each side of the ambulance; the front glasses of the lamps are white, the outside and rear glasses red. This ambulance wagon has 4 inside seats, 2 on each side, each 3 feet 8¾ inches long and 14 inches wide. Each seat is held in position by 2 legs of ⅝-inch round iron, secured to the floor by knuckle joints let in flush with the top of the floor and by 2 dovetailed hooks working in slots set into the side of the wagon. The seats are so arranged that when packed they hang against the sides of the wagon, thus forming side cushions. Two wooden tanks, 24¾ inches long, 9 inches wide on top,

8 inches on bottom, 6½ inches deep, with one nickle-plated faucet each, are placed 1 inch below the sills of the body in front of the center bar. They slide on grooved bars 1¼ inches wide, 1⅝ inches deep, which extend the full width of the body of the wagon. The litter for the ambulance wagon is shown in the accompanying figure. The ambulance complete weighs 1,450 pounds.

The course of training laid down for the sanitary soldier in the U. S. Army, and the results obtained therefrom, are admirably outlined in the address of Brig. Gen. Charles Sutherland, U. S. Army (Surgeon-General retired), delivered before this section.

ORDER OF EXERCISES.

Hospital Corps drill.

(1) Inspection of Hospital Corps detachment.

(2) Inspection of the field hospital, including field appliances, method of administration, etc.

(3) Bearer drill, with hand litter; with extemporized litter; (blanket, coat, and rifle); lifting, lowering and carrying patients by 4, 3, 2, and single bearers; passing obstacles; with ambulance.

(4) First aid drill. The application of temporary dressings; utilizing materials for splints, etc., ordinarily at hand on the field of battle. Subjects: Fracture of right clavicle; dislocation of left shoulder; fracture (compound) of right arm, middle third; fracture of left forearm, near elbow; hemorrhage from right femoral artery (middle third of thigh); flesh wound of scalp (large) over right parietal bone; perforating gunshot wound of left chest; gaping knife wound, right abdomen; fracture (compound) of left femur, lower third; fracture of right tibia, middle third; sunstroke; resuscitation of apparently drowned.

(5) Assembly of squads and return of litters.

(6) Tent pitching and striking.

(7) Formation and dismissal of detachment.

Afternoon Session.

The meeting was opened at 3:30 o'clock with the executive president in the chair. He said:

Gentlemen: The next subject upon our programme is a discussion on "first aid to wounded and transportation of wounded from the battlefield and field hospitals." You have witnessed the demonstration made by Maj. Hoff and many of those present are familiar with this work; several of our senior medical officers present are especially familiar with it and I shall first ask them to say something upon the subject and afterwards we will have a general discussion. I will call first upon Col. Page.

REMARKS BY COL. CHARLES PAGE, ASSISTANT SURGEON-GENERAL, U. S. ARMY.

Mr. President and Gentlemen of the Section: After the very able and exhaustive address we heard this morning, and the object lesson that we have just had, it seems to me there is very little left to discuss. There is one thing that occurred to me while witnessing the demonstration, and that is we can not expect to give aid to every wounded man. In case of battle a great many wounded men will get off the field without any assistance whatever. I think we can all speak in praise of this hospital corps and litter drill. I am certain that in future wars the wounded will be much more carefully handled than they were in the past. In the same way that skilled labor is better than unskilled.

There has been a great deal said about the new firearm. Of course, we expect the number of wounded to be multiplied, and for that reason we must have a multiplication of hospitals and the Hospital Corps. I do not think there will be any diffi-

culty in that because the subject is one that is receiving particular attention by the armies of nearly all nations, and in our country it is receiving particular attention not only by the regular Army but by the National Guard. At the beginning of the late war we had a sanitary commission and a Christian commission, but they did not remain long with us. At the second battle of Bull Run I remember starting from Washington with a party of volunteer nurses to pick up the wounded. The men having had no experience or previous training could not be depended upon and were soon glad to get back to Washington.

Mr. President, I do not think I have anything to offer which is original in regard to this matter and will not occupy the time of the session further.

REMARKS BY COL. B. J. D. IRWIN, ASSISTANT SURGEON-GENERAL, U. S. ARMY.

Mr. President and Gentlemen: Those of you who have been through our late war and who have witnessed the drill of our Hospital Corps to-day will be able to appreciate the wonderful progress we have made since that time. We see it here under some disadvantages in regard to the number present. If you could have seen it as I have recently where there were some 40 or 50 men drilled at a time through all the maneuvers upon the field, you would appreciate still further how far we have advanced in the management of our wounded on the field of battle. We are reaching perfection, but we have not quite reached it yet. There are a good many little details that can be improved upon. Some of them, of course, may not be manifest to those who have not paid attention to that branch at present, but by and by they will be observed and made right.

There is one point which I desire to call special attention to as it involves the care of the wounded by our volunteer forces and our militia, and that is, too much reliance is placed upon what is known as company bearers or litter bearers. In my recent inspections, during the last three years, I have become convinced that it is unreliable. We have a detail of, say, 4 men from each company. They are supposed to drill in certain matters, such as first aid, etc., but, as a general rule, you will find that you can not depend upon more than 1 or 2 of them to turn out when necessary. They may be on detached duty, furloughed, or some particular occupation that will render it impossible for them to be present for drill. They are under the control of the commanding officer, under his orders, therefore I deem it necessary that we should increase the number of men.

I would go further and recommend that all enlisted men get from 4 to 6 drills each month and be instructed in ordinary care of the wounded; how to lift them; how to assist them; not all the duties pertaining to the Hospital Corps men. In that way you will always have a number of reliable men who would be all the more valuable in time of war. To show the indisposition of the men to do this duty I will illustrate: They get off as frequently as possible under one pretext or another and say they have other military duties to perform than "playing the sick soldier," and the company commanders look upon it as rather burdensome, taking them away from their companies. A short time ago a medical officer obtained permission to drill an entire company, and in a few days they were instructed in litter drill, etc., and all able to take care of each other; there was no condition in which they could not give practical assistance to a wounded companion. Therefore, I think the time is approaching, if not already at hand, when we should make an effort to have our enlisted men drilled to a limited extent, as I have stated. Then the soldier should be furnished with a few things which should be carried at all times and which would be useful in an emergency.

The present system of Hospital Corps companies I regard as most excellent. The men are properly and thoroughly trained in the work, and being educated in this way are of the greatest value not only to the Medical Corps but the Army at large.

REMARKS OF COL. CHARLES H. ALDEN, ASSISTANT SURGEON-GENERAL, U. S. ARMY.

MR. PRESIDENT AND GENTLEMEN: I join very heartily in expressing the pleasure I am sure we have all had in witnessing this interesting drill, but I do not know that I can add very much to what has been said. It has been particularly interesting to me, as I have recently come from the medical charge of a department in the Northwest, where our officers are very much scattered at isolated posts and the post surgeons have had to work out this problem from the manual for themselves. There was a decided tendency at the outset, I found, to introducing the parade element, with quickness of movement, etc., but I think this was quite natural, and since they have come to know and appreciate the practical value of this hospital corps drill very much of that has disappeared and there is a growing feeling of its usefulness, not only among the medical officers, but among line officers as well.

In regard to the point raised by Col. Irwin, I would add my voice to his in that regard. I have a very strong feeling that the detail of company bearers as at present arranged is of very little value. They are usually the most intelligent men in the company after the non-commissioned officers, but their regular attendance can not be secured, and they are constantly changing in personnel. For these reasons the instruction can not be made what it should be. It practically amounts to very little even with the best efforts. At one post in the department of Dakota the commanding officer suggested that the post surgeon should take each organization in turn and instruct it every afternoon at a time when the men were not otherwise occupied. This was done, and the company drilled every afternoon for about six weeks until the post surgeon was able to report to the post commander that he had carried the work as far as it would be advisable. The result was quite satisfactory. I question very strongly whether it is worth while to go into their instruction in anatomy and physiology, except to a very limited extent. I think we must rely upon teaching them only the most practical duties. It is only instruction in first aid on the field that has enlisted the interest of the men. By the instruction of the men of the company generally we have a large number to draw the company bearers from in time of need.

REMARKS BY MAJ. D. L. HUNTINGTON, SURGEON, U. S. ARMY.

MR. PRESIDENT AND GENTLEMEN OF THE SECTION: The utility of an organized corps of hospital attendants and for duty on the battlefield during the late war of the rebellion became at once apparent as a necessity, and, after some time, an ambulance corps, as it was then called, was organized by a special act of Congress and men were instructed in the duties which would be incumbent upon them on the field of battle. I may say that in time our ambulance corps in the years 1864–'65 became under its organization as perfect as the necessities of the circumstances would allow. At the close of the war we of the Regular Army went back to our old system of attendants, cooks, and nurses. All the medical officers present will appreciate fully the trouble that resulted from that course, and gradually it became evident that something must be done to raise a force for attending the sick in hospital and for use in the field during time of war. I was fortunate enough to be in Washington at the time when this matter was brought to the attention of Congress. Gen. Bragg, of Wisconsin, then chairman of the military committee of the House of Representatives, took an active interest in the matter. Realizing that some other means must be determined upon to raise men for duty in hospitals, he requested me to report a bill organizing a hospital corps. He said: "That is what we want." Gen. Moore was then Surgeon-General of the Army. I was sent for by Gen. Bragg to superintend the appropriations for the Medical Department. We sat down together and in a few hours constructed the bill which afterwards became a law. The design of that bill was to secure a class of men now

known as hospital stewards, who should be intelligent and capable men, and a second class of acting hospital stewards who might take their place at any time and be eligible for promotion to the first grade. We wished to give each of these men in their respective grades that sum of money which would enable us to secure the services of desirable men and make it an object for them to enter the service. It was introduced in the House the next day and in two days more it became a law. From that time, having this bill to start with, we have added improvements and the result you have seen in Maj. Hoff's demonstration this afternoon.

I believe the organization of the Hospital Corps is now as perfect as it can be made under the circumstances. We desire nothing more than that this should be the nucleus around which in time of war we can gather the volunteer forces. And I believe that in every post the bill is carried out. I have taken great interest in watching it and trying to harmonize the different parts of it at the different posts. The attendance has not been what it should be, although there has been some improvement in this at nearly all posts. The drill is now 4 times a month and becomes tedious. Something must be done to change this. I think the suggestion made by Col. Irwin is a good one, that a company should be taken and drilled. I think each post surgeon should interest himself to talk with the commanding officer and show him the good that can be derived from it, and company officers would willingly put the post surgeon in the way of devising some plan for the general instruction of the men of their companies.

It often occurs that an accident happens in the barracks. A man falls down stairs, or falls into a pit, and is injured, or falls in the water and is taken out apparently drowned. In two instances this service has been the cause of saving the life of 2 men. I trust with the added interest which the new Manual of Drill will inspire at all the posts, and as company and post commanders become more and more interested the difficulties will gradually die away.

I believe the Hospital Corps has over and over again proven its utility.

REMARKS BY PASSED ASSISTANT SURGEON HENRY G. BEYER, U. S. NAVY.

Mr. President and Gentlemen of the Section: I have for a number of years watched with what I might almost call jealousy the progress which has been made in this direction in the Army, and I can only express my admiration for the able manner in which this has been conducted from the beginning to the end. To-day is the first time I have had this long looked for opportunity of seeing a practical drill in the field. The U. S. Navy has no regular drill in first aid to wounded.

I agree with the preceding speakers in regard to personal instruction to all enlisted men. Every man in the company ought to be able to take the place of those regularly drilled company bearers. They ought to be able to assist each other. We all know that in time of war there are never enough trained men present to do what there is to be done.

I can only express my thanks and my admiration for the able manner in which this drill has been conducted, and I hope the day is not far off when we in the Navy will be equal with the Army in this respect.

REMARKS OF CAPT. C. E. WOODRUFF, ASSISTANT SURGEON, U. S. ARMY.

Mr. President and Gentlemen of the Section: I intended to make a few remarks this morning after Dr. Conner's paper. As it has a very close connection with the subject of transportation of wounded men from the field, I ask permission to make them now, as you will see when I finish that it relates directly to the subject under discussion.

I want to ask somebody to think out and give to us military surgeons some definite rules for our guidance in the field. They have worked out in the most admirable way rules for their own guidance in hospitals, and we read in medical journals

what is to be done for this and that, but when we come to apply them I do not know where to turn. To illustrate: We take first the question of antiseptics in the field. Prof. Joseph Lister points out the fact that every one of the principal disinfectants used by surgeons depends upon large quantities of sterilized water. This is almost impossible in the field. We have never yet had large quantities of water and I do not know how we are to get them. He points out that in certain places where battles are fought water is scarce; at other times it is plentiful. We are liable to have a battle any time where we can not get water, and of course we can not use fresh (?) water without its having been sterilized. Of course, we might overcome this in certain cases by having a system whereby certain men could be drilled in securing large quantities of water and keeping it aseptic for our use, but unless this is done we would be without this means of relief.

The next point is dust in the field. This is so important that surgeons construct special operating rooms to keep out the dust, and they contend that it is only in these rooms that certain operations should be made. Now, imagine how we would be situated in a tent with the wind blowing at 60 miles an hour, as it sometimes does at my post. I had an operation to perform in the open field. I had certain basins full of antiseptics, but on account of the wind and dust I was unable to use them. Now, in a tent it is going to be almost as bad, and there are some operations that could only be performed in the hospital. For lack of time how little can be done by the surgeon on the battlefield. Then again, is the lack of instruments we have in field work. Any man who makes a success in a particular line of work has an abundance of special instruments at his side. Again, certain operations for certain injuries or diseases depend for their success upon the previous preparation of the patient. Attention was called to this this morning. Now, in military work we never see the patient until he is brought to our table, and the subject of previous preparation must be thrown overboard entirely. We can not expect to get those results that are achieved in civil practice.

Another point, which civilian physicians are not often confronted with, is the question of the filthy and horrible condition in which soldiers will get after a very long and severe campaign. Nothing like it in civil life is seen except in the very lowest slums of large cities. Soldiers may go for days without seeing water; can barely get enough to drink, and as to taking a bath, it is utterly out of the question. They have often gone on the field of battle covered with vermin, etc., and the probabilities are, therefere, that every wound such men receive will be an infected wound.

Now, take up the question of injuries to the knee: In statistics recently I saw that if these cases are not seen for twenty-four hours something like 80 per cent die. If they are seen immediately they will recover. All cases of this kind, as well as gunshot wounds of the abdomen, should, of course, be given the right of way over all others and sent immediately to the rear. Even compound fractures should be put aside and these given the preference and hurried along as quickly as possible where appliances are on hand for proper treatment.

REMARKS OF LIEUT. COL. WILLIAM H. FORWOOD, DEPUTY SURGEON-GENERAL, U. S. ARMY.

Mr. President and Gentlemen: I had no intention of entering into this discussion, and do so now merely to say a very few words.

In addition to what you saw illustrated outside on the lawn, the Hospital Corps is supplemented by certain men taken from the ranks, called company bearers. There are 4 of these men to each company, who report to the surgeon for instruction. As has already been said, that plan is a failure. It causes friction between the company and medical officers. I have insisted from first to last, ever since the Hospital Corps organization came up, upon a plan to remedy this, which has been

alluded to in part, and which I wish to state more fully. That is, to add a few simple tactical forms to the drill regulations now in use by line officers, and by the use of which the men can be instructed to aid their companions on the battlefield. This should be done in every company by the company officers all through the Army. The medical officers should have nothing to do with drilling the company bearers. It is not necessary. Medicine and surgery have become of sufficient importance that we may now instruct not only the enlisted men, but the officers, in the principles of first aid, and everyone liable to be wounded should be instructed in rendering assistance to their comrades and themselves on the field of battle.

The officers should instruct the men and the surgeon instruct the officers. I have advocated this plan since the corps was first organized.

REMARKS BY PROF. P. S. CONNER, M. D., OF CINCINNATI, OHIO.

MR. PRESIDENT AND GENTLEMEN: I want to express my great pleasure and admiration in what I have seen to-day in the demonstration of the Hospital Corps drill given by Maj. Hoff.

With reference to this matter of treatment of injured men, it seems to me it is to be remembered always that simplicity is of great value. It is not necessary that multitudinous arrangements should be made, and it is not necessary that a man should have a great many instruments to perform an operation. A most important thing is to place an antiseptic pad on the wounded man, and, if he is carefully handled, he may go twelve hours, or, if necessary, forty-eight hours, before the operation is performed. If a man has not what he wants, he must use what he can get. You can not have all the things that are supplied. True, the result may not be as satisfactory, but it will be vastly more satisfactory than the results obtained in old times. It strikes me, as I look back upon my army life, that many cases would have been much better treated had I known then what I know now; and I am sure that the same thought would apply to others. If a man has a gunshot wound of the kneejoint, let him alone. *Dirty fingers and dirty probes have killed more men than bullets.* One can get along pretty well with a very few things and a limited supply of water.

REMARKS BY MAJ. J. S. BILLINGS, SURGEON, U. S. ARMY.

MR. PRESIDENT AND GENTLEMEN OF THE SECTION: There is a maxim among engineers that it is not worth while to design a building or a bridge in such a way that it shall withstand a tornado. So I fancy that in our arrangements for dealing with the emergencies of war it would not be wise to undertake to provide for every possible contingency. I have seen a reasonable number of battles and I have never been in position where I could not get plenty of water, such as it was, and I have always had boiled water. There is very great weight to be placed upon the remarks of my friend Dr. Conner about the necessity of doing the best you can under the circumstances. In the days of 1862 in Washington we preferred to get those wounds that had never been dressed at all, except by the man himself with a rag.

The question immediately before us is this matter of the hospital corps drill and transportation of wounded from the battlefield. I had to deal with transportation of wounded in the early days of the war when there was no organization. Soon came the ambulance corps, which worked extremely well—when it was present. And then came one of those "tornado" cases. We had a fight the first day. We had about 11,000 wounded, and the ambulance corps was occupied in getting the wounded back to the rear. The next day immediately following this we had another fight, and there was no Ambulance Corps. And yet I do not mean to say by this that it is necessary to have two ambulance corps in an army. We made ambulances in those days out of commissary wagons and ordnance wagons, covering the bottom of the wagon to the depth of 3 or 4 inches with blankets.

I approve of the system of putting tags on cases that require the first operation. We used it successfully at Gettysburg, and a few men were picked out to be attended to immediately. When you have a large number of wounded they do not take their turn at all. They are examined rapidly and the men picked out who are the worst injured.

With regard to the drill to-day, I can say that I have seen similar drills in the English armies, the best one being at the St. Thomas Hospital in London, where all the medical students are trained to have that knowledge who become medical officers; and that is the point Dr. Hoff has suggested. I think extremely well of it. I may say that after having seen the drills at Aldershott and St. Thomas, I think the exhibit of this afternoon is perfectly satisfactory as compared with them. I do not say it was the best, but it was a very satisfactory exhibit.

One might get the idea that men are enlisted in the hospital corps for the purpose of going about and picking up the wounded. Now this of course is erroneous. They have to be made trained nurses, and this is a very important part of the business of the men of the hospital corps. It is one of the things with which we had the greatest difficulty before the Hospital Corps was organized. The trouble was to get men who would stay and do nursing and go through the long, tedious, difficult and oftentimes disagreeable duties of the nurse. That is a very essential feature, and one which has been borne in mind in prescribing their duties and arranging for their instruction. What you have seen to-day is rather the showy side of the work of the men of the Hospital Corps.

REMARKS OF DR. ALBERT VANDERVEER, ALBANY, N. Y.

Mr. President and Gentlemen: I read a year or more ago Dr. Hoff's little book which he published at that time, and was very much interested. To-day I have been more than pleased in witnessing the maneuvers of these men, and I realize now how much good will come of the knowledge acquired here in the way of extending it in civil life in this way.

We have in our State a most excellent fire brigade, but I have seen people taken out of buildings in a manner that was anything but pleasant by the firemen, who, although they meant well, had never been instructed in this art. These men having leisure time, it occurs to me that this system could be profitably extended to the fire department.

As Dr. Billings has said, it is not altogether the men who can pick up the wounded, but the men who will stick by them afterwards and act as nurses, and I could see here to-day that these men had been well posted, especially in regard to hemorrhage, and they are capable of knowing something about anatomy, etc.

REMARKS BY MAJ. JOHN VAN R. HOFF, SURGEON, U. S. ARMY.

Mr. President and Gentlemen of the Section: The deepening shadows warn me that there is left but a few moments to conclude this most interesting discussion, and I will devote the time to a single phase of it, the company bearer.

I hesitate to advance an opinion upon this subject, in this company, no matter how firmly I am convinced of its correctness, lest it would seem presumptuous in me to even appear to take ground against the views of those whose opportunities and experiences in all phases of military sanitation have been far beyond my own.

Have we not, I may ask, been considering the company bearer from the wrong standpoint? He certainly is an important factor in the sanitary organization of an active army. Is it not possible that nearly thirty years of comparative peace have made us forget the ever present probability for which alone we exist, war? This is the standpoint from which, it seems to me, we should approach this subject, and the questions are—

(1) What is the best military sanitary organization for active service?

(2) How can we best make that organization apply to present inactive conditions?

The sanitary organization of an army, as I understand it, contemplates a permanent department, such as we recognize our Hospital Corps to be, which under ordinary circumstances is adequate to the work required of it. But experience has taught that no matter how large a Hospital Corps we have, oftentimes, unaided, it would be overwhelmed with work; consequently our sanitary organization also contemplates an auxiliary corps, which is called the "company bearers."

It is clearly understood that the company bearers are simply emergency men who, under certain circumstances, are to supplement the Hospital Corps. In order to an efficient performance of their important duty they must be instructed in first-aid work. It oftentimes would seem that company commanders fail to appreciate the value these men must be to their organizations, and thus failing, do not always select the best material for instruction. This is doubtless due to the prolonged period of peace. Some have never heard the whistle of a hostile bullet and others have forgotten its once familiar sound. To them wounds and other injuries cut no figure in their military scheme, and when an effort is made to prepare for these contingencies they cry *cui bono*. Commanding officers, too, are sometimes indifferent, and appear to forget the obligation imposed upon them by paragraph 1575, Army regulations, which says "The company bearers * * * shall be instructed * * * for at least four hours in every month." The regulation is absolutely mandatory; nothing excuses from at least this amount of instruction.

Perhaps we of the Medical Department are not wholly blameless for the unsatisfactory results reported by previous speakers. The opposition of the company commander and the indifference of the post commander will sometimes affect the not over-enthusiastic medical officer, and the result of bearer instruction under these conditions can not but be worthless, yes, worse than worthless, for it throws discredit upon a system which is absolutely essential to the proper care of the wounded in active practice.

I venture to offer my own experience in support of some of the foregoing points.

Since the organization of the Hospital Corps in 1887 I have served at 3 posts, widely separated from each other, and under conditions quite as varied as are the average conditions of the service. Upon the day I received the order directing the detail and instruction of company bearers I began that instruction, and for one hour each week, rain or shine, hot or cold, in post or field, I have continued it.

I have been fortunate in escaping the difficulty complained of by others of getting a large percentage of my bearers present for drill. There is always 80 per cent, and more frequently a much larger percentage present.

Now, since this has been my experience, and not the experience of others, how does it happen? The regulations state that 4 company bearers shall be detailed from each company and that they shall be instructed at least four hours each month. At my station they are detailed, and they are drilled four hours every month, one hour each week on the appointed day. On the day following each drill I make a formal report thereof in writing to the commanding officer as to the number of men present, the condition in which they reported, etc., so that he may be thoroughly informed as to the efficiency of the instruction and impressed with the idea that the medical officer is obeying the spirit as well as the letter of the law. Should the bearers fail to report at the appointed time I request that the absentees be sent at some other hour during that week. The result is, as I said before, I never have any trouble in getting company bearers for instruction.

The suggestion that the entire company should be instructed I regard as of value, but simply as an adjunct. I do not think we can get along without regularly detailed company bearers.

I might say much more upon this, to me, most important subject, but will stop with the narration of one personal experience.

It was my fortune to be the senior medical officer with the Seventh Cavalry in the North a couple of years ago. We had a pretty sharp fight with Big Foot's band of Sioux, and many people got hurt. After everything was over and the wounded were removed to the field hospital about 15 miles to the rear, an old cavalry captain, scarred in many an Indian war, a man who had gone through all the grades from private up, and who, rigid as a bar of iron in his views, was not easily susceptible to any new ideas, came up to me and said, "Captain Hoff, I want to say to you that I have often been instrumental, with others, in making sport of you and your methods, and have said that it was all d—d nonsense, but now I desire to say that I never, in all my experience, saw wounded men so well and quickly handled, and if any man raises his voice against your methods he will hear from me." I thanked him heartily, and then told him that to a very large extent the wounded were handled by his own men, the company bearers.

The section then, at 6 p. m., adjourned to meet to-morrow at 11 o'clock a. m.

THIRD DAY'S PROCEEDINGS.

WASHINGTON, D. C., *September 7, 1893.*

The meeting was called to order at 11:50 a. m. by Surg. Gen. J. Rufus Tryon, U. S. Navy. Gen. Tryon said: GENTLEMEN OF THE SECTION: I have been invited by the Surgeon-General of the Army to preside this morning at the session of the section on military medicine and surgery of the Pan-American Medical Congress. The first paper to be read and discussed is "The avoidance of intestinal disorders in the field," by Bvt. Lieut. Col. Alfred A. Woodhull, Surgeon, U. S. Army, and which will be read by Col. B. J. D. Irwin, assistant Surgeon-general, U. S. Army.

THE AVOIDANCE OF INTESTINAL DISORDERS IN THE FIELD.

By Bvt. Lieut.-Col. ALFRED A. WOODHULL, Surgeon, U. S. Army.

Excepting in the shortest of fierce wars, the deaths from disease greatly exceed those from injury, and the cases of sickness are much more numerous than those of wounds. This is so well recognized as merely to require announcement, not statistics. Among the diseases those of the intestines are usually the first induced; they far outnumber the others, and, when not fatal in the field, some forms of them persist for years after the campaigns are past. As with other evils, prevention is not only better, but it is usually easier than cure.

The induction of diarrhea may depend upon: (1) Indigestion. (*a*) With a newly raised army the dietary leads to it. Men always well at home when fed with accustomed food, will fail to assimilate the coarser table of the barrack or the camp. Large bodies of men, healthy on a diet peculiar to their own region, may suffer when transferred to another territory. They seek to subsist upon a diet indiginous there. As, for instance, in our civil war Union prisoners were made ill on the nutritious corn meal of the South, and Confederate prisoners sickened with the wheat flour of the North. It is well understood that troops from temperate climates in sailing through the tropics are to be guarded against their fruits. But when such food is good of its kind the system ultimately accepts it. (*b*) Soldiers perfectly accustomed to the military ration in barracks will break down under the imperfect cookery of the field. It is in that direction that the U. S. Army is accumulating wrath against the day of wrath. The average mess table of the permanent post is luxury itself beside what the ruder appliances of the field will yield, and the garrison mess, where both responsibility and instruction are removed from the company organization, is educating, if not a generation of epicures, at least one of incapables. Such men will go into the field with many wants and no resources. Failure to provide

instruction in field cooking is the special point of weakness in the organization of the National Guard, and it is where all newly raised armies suffer. Recruits fail to satisfy themselves with their field ration, and then fill their stomachs with all sorts of trash from the sutlers' wagons. The imperfect cooking of the camp, supplemented by the indifferent supplies of the sutler, is a fruitful source of indigestion and consequent diarrhea. A judicious medical officer will advise, and a competent commanding officer will enforce, strict supervision over food supplies outside of the subsistence department, with regulation and confiscation if necessary. Where the official commissariat is straitened, either in retreat or by reason of swift advance, foraging upon the country is sometimes imperative. This is liable to lead to the same result—semi-starvation, occasional repletion, and constant temptation to swallow unripe fruit or raw food. But these inevitable troubles are temporary in nature and are to be outgrown, as the teething of infancy. Some men succumb, but the most survive and may be the stronger for the experience. It is in the matter of food that, as I understand, the Mexican soldier, inured to frugality and to self-care, marches anywhere and is strong upon what would leave our men fainting by the way. We can never educate our volunteers, or even our regulars, to the Mexican standard, but with interested care our men at arms may have this evil minimized. (2) The direct action of drinking water. Change of water, so well recognized by civil travelers, is a still more active factor in the field than indigestion. For the unsatisfying, nauseous, and purgative alkaline waters of many deserts no remedy but distillation has yet been found, and distillation on a large scale is out of the question. It is a by-question here, but there is no doubt in my mind that malarial disease may be introduced through drinking water, and this may be a factor in diarrhea. Boiling practically neutralizes the poison, and, although inconvenient, this may be done. The soldier who makes his coffee in a tin cup can as easily boil water and fill his canteen with it. But unless watched, he will not. If the taste for tea, which is so much easier than coffee to brew, could be cultivated in armies the general health would be much improved, first by the boiled water and secondly by the astringent leaves.

A considerable amount of the hardness of water from lime salts, leading to diarrhœa, may be dissipated by boiling for half an hour; which again will not be done by troops on the march.

The mechanical irritation of mud in suspension is a very important cause of diarrhœa. To one who has not tried the experiment, it will be astonishing how clear water will become after resting from twelve to fifteen hours. This sedimentation is perfectly practicable in permanent camps that depend upon muddy rivers for their drinking supply. It can not be carried out with a marching column. Unless the water is very soft, and it may be artificially hardened for the occasion by the addition of a little lime or soda; alum will clarify it even when very muddy. A small quantity, 5 or 6 grains to the gallon, may be stirred into the water; or a large piece of alum may be repeatedly passed through it, agitating the water. The suspended particles are entangled with the calcium sulphate and the bulky aluminum hydrate and sink with them. This is a practical and very valuable process that has been used on a large scale with marked success, and is easily applicable in all cases where the individual soldiers do not draw their own water. Chopped cactus leaves will also clarify muddy water. The removal of mud not only means a good deal to the senses, but to the intestinal system, for it often provokes serious and persistent diarrhea. Portable filters, sometimes used as individual equipment and sometimes on a large scale, deteriorate with use. They require great care in cleansing not to become agents for the propagation instead of the prevention of disease, and, speaking generally, of intestinal disease.

(3) Variations in temperature.

(*a*) Cold. As soon as troops take the field the variations in temperature and the frequent necessity of sleeping in damp clothes or upon ground not perfectly dry lead

to much sickness. This is not always abdominal in nature, but a good proportion of it is. Terrestrial dampness is well neutralized by a waterproof sheet, but raw troops can never be induced to carry on the person anything for which there is not an evident and constant necessity. In permanent camps dry resting places can be obtained, and often in bivouac an old soldier will make such. But on the march the most of the men must lie as the ground offers itself. This nocturnal cold operates through the same channels as excessive heat.

(*b*) Heat. In my opinion solar heat, and in a less degree animal heat, leads to a great deal of diarrhea. The abdominal blood vessels are numerous and capacious; they are distributed so as to be easily drained by exosmosis into the intestines; they are readily influenced through the walls of the abdomen. It is an anatomical fact that all the blood in the body may be concentrated in the vessels of the abdomen without occupying their full capacity. Now, solar heat acts in two ways, (1) by gentle stimulation, keeping the arterial tension at the proper key, and (2) by the relaxation following excessive heat and the passive dilatation leading to overflow. That is to say, either the vessels of the belly may be in good condition during the day and suffer from cold at night; or, in hot weather, they may be fairly paralyzed by the heat and become congested canals ready to exude at every point. The correction and especially the prevention of this condition, a condition that by opening the way to simple diarrhea may lead to widespread disease among bodies of men, has great interest to medical officers upon whose prevision the health of armies largely depends.

In warm, and even in what are called temperate climates, the protection of the abdomen is of very great importance. From immemorial time the natives of India have used the "cummerbund," a protective wrapping around the loins, to fortify the contained organs against the debilitating agency of the climate. Under the grim name of cholera belts the English soldiers and the United States sailors in tropical climates are served with what might better be known as abdominal protectors. I know by practical experience, under both civil and military conditions, that it does not require tropical residence to make a flannel apron, large enough to cover the abdomen and worn under the clothing, an almost certain preventive of heat-diarrhœa and a frequent remedy for it. The apron should be large, reasonably thick (preferably double), and worn next to the skin. By conserving the cutaneous temperature it keeps the blood near the surface or draws it thither after diarrhœa, not due to mechanical or specific causes, has set in, following passive congestion. It is so simple a device that the ignorant, unless compelled by discipline, discard it and the learned overlook it.

But, as already said, diarrhea is a disease of armies. Cases and many cases will occur in spite of the best care. It is also true that enteric fever is a disease of modern armies, if not of the older ones. "Camp fever," which formerly was a synonym of typhus, has almost come to mean typhoid. The disciples of the specific doctrine are compelled to admit that this disease is coëxtensive with modern warfare in desert as well as in inhabited fields. Whatever theoretical objection there may be to the pathogenic doctrine formulated by Murchison that this disease "may be generated independently of a preëxisting cause, by the fermentation of fecal and perhaps other forms of organic matter," it is quite unsafe to reject it off-hand as applied to troops in campaign. Davies, of the British army, has shown the strong probability that enteric fever in the field is diarrhœa-bred. The observations made by Arloing, Gabriel Roux, Von Babes, and others point to a connection between the bacillus communis coli and the bacillus of Eberth.

I have long believed that in the course of many bacterial generations, which may be included in a relatively short season, an innocent bacillus by its environment may become pernicious, and I see no reason why, in the interest of safety, this may not be adopted as a working hypothesis. I think we are warranted in holding that in the field every case of fever, not distinctly paroxysmal, should be looked upon as

enteric until the contrary is proved, and particularly that every camp diarrhœa is to be regarded as a possible source of infection. I do not wish to be misunderstood as holding that all camp fevers may become enteric, but to insist as a precaution necessary for the health of the command that those preventive measures be taken habitually that would be enforced with a developed case.

However camp diarrhœas originate, and I believe that they are in part malarial, in part due to changes of temperature, and in part specific, there is little doubt that once established they are widely spread by the dejecta. Foul sinks and the droppings outside of sinks become foci. It is a well-established dictum in all armies to avoid old camping grounds. But the same reason that forbids one to live among the excreta of our predecessors forbids us to make our own camp foul. Unnatural as it may seem to those accustomed to the refinements and conveniences of domestic life, freedom from fecal pollution is one of the most difficult conditions to enforce. The relief of nature is often so pressing as to be imperative, and few camp guards are so vigilant as to prevent a contaminated fringe outside of the directly inhabited limits. Within the lines the cover of night and the pressure of diarrhea are conditions often leading to the same state. This is particularly apt to be the case with raw troops.

These details are not pleasant to recite, but it is among the most important duties of a medical officer to see that all such factors are eliminated, or, more correctly, are not created. After guarding the water supply, the most important duty on establishing a camp is to prepare the sinks. Ordinarily the two can be done simultaneously; and the care of each is a constant charge. The condition of the sinks is a good measure of the efficiency of the camp, just as the state of their closets indicates the civilization of a community. Some military writers say that every camp longer than for over night should have a sink. In my judgment every camp, certainly in a warm climate or as part of those of a large army, although designed for only a night, should have its sinks, because no one can foresee what delays may occur. The oft-quoted orders of the great Israelitish general, Moses, on this subject (Deut. XXIII, 13) are as wise now as when issued. If this use of an independent intrenching tool could be enforced in bivouac, it would prove a defensive weapon in the best sense, guarding both the man and his comrades. The evil to be apprehended in unpoliced camps is that which dominates India: Air and water contaminated by flying desiccated particles of organic matter charged with causes of disease. Unless properly covered in, the sinks themselves, as reservoirs of concentrated distemper, are liable to make those who use them ill; for some forms of dysentery, at least, are eminently infectious to those directly exposed to the emanations from the discharges.

There are other forms of disease than intestinal that may ravage an army, but if this column can be effectually resisted much evil is averted. The foregoing are among the key-points for occupation by sanitary scouts, upon whose unobtrusive discharge of duty so much military efficiency, the prerequisite for success, depends.

The paper being open for discussion, Col. C. H. Alden, assistant surgeon-general, spoke as follows:

MR. PRESIDENT AND GENTLEMEN: One means of preventing intestinal diseases is, as stated, to secure good cooking, and in this connection I have been requested to give my experience as to the relative value of post and company messes. We have not in the Department of Dakota any post mess, but of course the question is one that has come before us and received a great deal of thought and consideration. The great objection to the post mess in a department in which troops are stationed for defense against Indians, and in which constant field service is expected, is that each company must be ready for action, and its mess outfit and material ready for immediate transportation. This is a very serious objection and at the same time a very difficult one to overcome, and I think we must approach the question in this way—that the post mess has its undoubted advantages for stations that are permanent. It is

not equally advantageous for posts on the frontier. There are very great advantages in connection with the messing of troops in the post mess. There is a greater saving when all the men are messed together, better food can be supplied, and they get more skillful cooks and have better inspection. One officer perhaps can be picked out to take charge of that service who is particularly adapted to it.

I should say, therefore, that each has its proper place, the post mess for permanent posts and depots where detached service is rare, and the company mess for temporary posts and stations on the frontier.

REMARKS BY COL. IRWIN, ASSISTANT SURGEON-GENERAL, U. S. ARMY.

Mr. President and Gentlemen: I believe that in the Department of the Missouri, of which I am medical director, we have three of these post messes. One at Fort Leavenworth, one at Fort Riley, and one at Fort Sheridan. The oldest or first established of these three is at Fort Riley, the next at Fort Sheridan, and the next at Fort Leavenworth. I know that there has been great improvement in regard to the manner of keeping the mess. The Sheridan mess is much better than at Fort Riley, and the Leavenworth mess is a model of perfection.

The messing of large bodies of troops, especially such as at West Point, for instance, partakes a good deal of the character of a hotel. It has its advantages and disadvantages. In the military service the great disadvantage is that the troops are not all prepared to cook for themselves, especially on the frontier, as we used to call it; but our frontier has in a measure disappeared; it does not exist any longer. I think there will be no trouble in regard to this messing. The condition of military life in the United States is undergoing a very rapid change, and, as I said, our frontier is rapidly being obliterated.

REMARKS OF DR. BEDFORD BROWN, OF ALEXANDRIA, VA.

Mr. President and Gentlemen: I have listened with a great deal of interest to the excellent paper by Dr. Woodhull. I think he has covered the ground remarkably well.

I only wish to make an allusion to a single point in relation to this question of intestinal diseases in armies. I have no personal knowledge of the habits of the regular soldier. My experience has been confined to the volunteer service. I wish to allude to the vast difference in the number of cases of intestinal disease and the gravity of those cases as between the educated and cultivated and the ignorant and illiterate. I found that there were probably five cases of intestinal disease among the illiterate where there was but one or two among the educated soldiers. We had in our Confederate army of course a great diversity—all kinds—and those men were thrown together in the same companies necessarily. We naturally ask why should the illiterate soldier be the victim of this disease any more than the educated. The illiterate soldier is supposed to have an equally vigorous constitution, if not more so, but we often found that the clerks taken from villages and towns, and young lawyers and young gentlemen of leisure in the Southern army were rarely subject to these forms of disease, while the illiterate, taken from the same counties, had them by hundreds and thousands. I simply want to say that I think it is due to a knowledge of hygiene on the part of the cultivated; and not only that, but the natural pride of the cultivated man leads him to different pursuits and different habits.

Now as to the cooking: This paper put great stress upon that, and I think justly so. It is of the greatest importance, and especially so in army life, as not only a matter of comfort and pleasure but a matter of hygiene. The cultivated man had his cooking prepared in a way that cultivated people live, as far as it was possible to do. The illiterate man had his prepared in the way he was accustomed to prepare it at his home, and there was all the difference in the world between the two methods. They both had the same rations. There was no difference whatever that

I am aware of in that respect, but it was in the method of preparing the food. There was the point. And I believe that if a great army could employ a scientific head cook, with scientific and practical assistants who could prepare food not only palatable to the taste but digestible in the stomach, many of these intestinal disorders would be avoided.

REMARKS BY MAJ. D. L. HUNTINGTON, SURGEON, U. S. ARMY.

MR. PRESIDENT AND GENTLEMEN: I would like to occupy the attention of the section for one moment. The train of thought which has been so admirably presented by Dr. Brown is one upon which I intended to make a few remarks.

In the department which I represent (the old Department of Arizona, but now merged into the Colorado) at certain large posts in Colorado and Utah the company-mess system still prevails. Whether there is any modification now or not I am unable to say, but a visit of inspection through Arizona and New Mexico, where this system still exists, shows it is bad enough.

I think attention should be given toward scientific cooking in the Army, and the suggestion which has been offered by Dr. Brown to secure the services of one or more scientific and well-trained cooks, whose business it should be to educate and train up cooks for our different posts, is an excellent one. Until something of that kind is done we shall have no cooking that deserves the name of cooking. Some posts have the advantage of the services of a man who is fond of it and who has made a study of the science, and consequently the meals are well prepared; but that man may be sent away and the company goes back to the same old way. In peace as well as in war the troops should be well taken care of, and this is probably one of the most important points to be investigated and discussed.

REMARKS BY MAJ. JOHN VAN R. HOFF, SURGEON, U. S. ARMY.

MR. PRESIDENT ANE GENTLEMEN: I will offer but a word in the discussion of Col. Woodhull's admirable paper, and that upon but one subject—the feeding of our Army. While stationed at Fort Riley, Kansas, I saw the post mess there organized and carried through many tribulations to a successful result. My conclusions, based upon three years' experience with that mess, are summed up in a report to the Surgeon-General, U. S. Army, from which I venture to quote. * * *

The departure of this command would take out of the mess hall every man familiar with its workings. A new garrison would have to organize at the foundation and learn from experience what has been gained here by nearly three years' trial. I have reason to believe that experience would be a bitter one, and unnecessarily so, since, with a permanent personnel (which might be obtained through the instrumentality of the general service), a change of garrison would not leave the mess hall, as it now will, without a single man who knows anything of its workings. I have suggested the general service as a present means of attaining the end in view, but ultimately there should be a regularly organized corps attached to the subsistence department, from which mess hall and bakery assignments could be made. * * *

The proposed corps would necessarily be made up of cooks, bakers, waiters, etc., and with proper military organization would ultimately become an admirable training school of cookery, through the instrumentality of which a practical knowledge of good cooking, both in camp and garrison, would be disseminated throughout the entire Army.

Referring to Col. Woodhull's remark that "if the taste for tea could be cultivated in armies the general health would be much improved, first by the boiled water, and secondly by the astringent leaves," I desire in this connection to call attention to the advantages that are offered by the use of compressed tea tablets, in their smallness of bulk and ease of manipulation. Messrs. Parke, Davis & Co. are now experimenting at my request with a tea tablet containing saccharine, which I have no doubt will prove entirely satisfactory. A soldier will by this means be enabled to carry what will make three gallons of tea in a receptacle much smaller than a pocket match safe.

PERSONAL EXPERIENCE IN OBSERVING THE RESULTS OF GOOD AND BAD SANITATION IN THE CONFEDERATE STATES ARMY.

By DR. BEDFORD BROWN, of Alexandria, Va.

During the first two years of the late war the laws of hygiene were greatly neglected in the conduct of the army of the Confederate States.

As a result of this neglect of the common laws of health, there was necessarily an enormous amount of disease and a high rate of mortality. This neglect of proper sanitary arrangements was not so much due to a want of intelligence or scientific knowledge, or a sense of their necessity, but rather to the unusual state of confusion incident to a condition of revolution in its incipient stages, and again to the general prevalence of the idea that the war would be a brief one. But as time rolled on and the war assumed larger and more gigantic proportions, and the end appeared more distant, the necessity of systematic attention to the hygienic affairs grew more apparent as a means of maintaining an army in full force and vigor for prosecuting a great war. Hence military hygiene, as the war advanced, became more and more a part of the army organization, and the inevitable result was not only an improvement in the health of the soldier, but an improved capacity on his part to withstand hardship, exposure, and privation.

In the commencement of this paper I desire to show you that an army located in the most salubrious climate, in a position of great altitude, with abundant supplies of clear spring water, surrounded apparently by circumstances the most favorable to human health, from want of proper attention to the laws of hygiene may become infected with the most deadly epidemic disease.

In the autumn of 1861 an army consisting of about 17,000 Confederates, under Gen. Robert E. Lee, was stationed for two or three months under circumstances of this kind on the summit of the Alleghany range, in West Virginia, in front of Gen. Rosecrans. The position of Gen. Lee was regarded as peculiarly favorable to health, and as apparently free of all septic influences, having a surface drainage that was perfect. But, notwithstanding all these natural advantages, this army was desolated by malignant disease, as typhoid fever, septic dysentery, and pneumonia. All cases of whatever kind rapidly assumed the typhoid type, indicating the gravity of the septic influence. In this army of about 17,000 there were at least 4,000 cases of disease, with an enormous mortality. We ascertained that the cause of the epidemic was purely excrementitial in character.

The entire army had been, in the absence of all sanitary arrangements, permitted indiscriminately to use the surface of the earth surrounding the camp for the deposit of the excreta of the sick and the well.

This excrementitial matter was washed daily, by copious rains, into the springs and fountains of our water supply, and was a constant source of pollution. The water, as it gushed from the mountain valleys, was beautifully clear and deliciously sweet, but when tested was found to contain a large amount of organic matter. In this connection I will cite another incident illustrating the results of prompt and thorough attention to the laws of hygiene in any army suffering from serious septic disease caused by unfavorable surrounding influences. During the months of August, September, and October, in the year 1862, in which the temperature ranged very high, the brigade of which I was senior surgeon was stationed at Drurys Bluff, on James River, after the great seven days' battle around Richmond. The locality was an open, flat, badly drained country that had been previously occupied by troops, and much of it was literally covered with human and animal excreta, which had from surface drainage been from time to time filtered into the fountains. Within a week, during this intensely hot season, an epidemic of typhoid fever, dysentery, and diarrhœa was developed, that threatened seriously to decimate the command. A large force of men was detailed daily with suitable implements, and not only the camp and entire surrounding country were thoroughly cleaned, but the springs and

streams were also cleaned and purified and kept in a scrupulously cleanly condition, and in addition ample privy vaults were excavated at a distance below the level of the water supply. Within a reasonable period, by means of these sanitary measures, this epidemic was effectually arrested, and the brigade became a model for healthfulness. The systematic and practical hygiene of camps and armies is an interesting and vital question. It is the very foundation of strength and efficiency of an army. It has fallen to my lot to observe and attend an army without proper hygienic advantages, and to observe its crippled, dejected, spiritless, disorganized, inefficient condition, and to compare it with an army whose state of hygiene was strictly attended to, and to observe the vigor and force of mind and body, the dauntless spirit, the endurance of hardship and exposure of its soldiers.

At this stage of our progress I propose to present for consideration my personal experience, in the Confederate service, in the practical methods adopted for improving the sanitary condition of camps and promoting the health of armies.

In the preparation of this paper I have endeavored to discard all theoretical ideas and adhere strictly to facts based upon my own personal experience.

In considering the hygiene of armies, there are three subjects which must elicit our constant interest and study—the condition and quality of the water we drink, the air we breathe, the food we consume and its method of preparation. In the Confederate service experience proved that an army in motion or active service enjoyed better health and had a smaller death list from disease than one stationary in quarters. Even with the most scrupulous attention to hygiene there is an accumulation of a certain amount of débris, vegetable, animal, and excrementitial, that pollutes the common carriers of disease germs, water and air, of a great stationary body of men.

Then again, day and night, a stationary army is constantly inhaling an atmosphere that has passed through the lungs of thousands of healthy and diseased lungs an innumerable number of times. Another reason is an army shut up in quarters suffers for the want of active physical and mental exercise. On the contrary, an army in motion has the advantage of breathing a fresh air every moment while in action. It has also the advantage of drinking from fresh, unpolluted fountains of water. There is no accumulation of débris to contaminate either.

Fourthly, its digestion, assimilation, nutrition are promoted by an active physical and mental exercise.

Fifthly, active mental and physical exercise is always cheering to the spirits of an army. The corps of Stonewall Jackson, though almost constantly in motion, subjected to all the hardships, exposure, privation, and fatigue incident to long and forced marches, presented the smallest sick list and bills of mortality of any other corps in the Confederate army. These important facts teach us a lesson in military hygiene that is of value. In devising and executing my sanitary arrangements for the protection of the health of that portion of the army under my immediate medical supervision, when in quarters or stationary, I endeavored, as far as practicable, to imitate an army in motion—in other words, by scrupulous attention to cleanliness, changing the location of tents and quarters every twenty-four hours in warm seasons, and by cleansing the fountains of our water supply every twenty-four hours, to insure pure air and water. I discovered by practical experience that an army employed was far more healthy, happy, and contented than one in idleness. Idleness always breeds disease, discontent, and death.

My habit was, when I found my sick list increasing, to advise all hands to be put to work; it was not material what kind of work, so that it gave employment to mind and body.

I had a splendid regiment of Southern young men under my professional charge, at one time in 1861, which suffered fearfully from the effects of *nostalgia* or *homesickness*. They had never been from their homes except at brief periods, and while stationed in quarters the effects of *homesickness* became truly disastrous and alarming. These young men, the pets of their families and the life of their comfortable

homes, in camp life would absolutely sink down into a state of listlessness and apathy, with the entire loss of spirits, hope, appetite, and ambition, and would fall an easy prey to all the diseases of army life.

It was ordered that every man in the regiment daily, from morning till night, be put to work with axes, hoes, rakes, cleaning up camp, changing the location of tents every day, cleaning up fountains, draining swamp lands, chopping and hauling wood, and very soon the good effects on body and mind were marvelous. When there was no work I studied to make work, and I was amply repaid. I will here present my method of camp hygiene in detail, but as briefly as possible.

The absorbent powers of the earth's surface occupied as a camping ground by a large body of men and covered by tents so as to intercept the rays of the sun are simply enormous. Under these circumstances the earth absorbs rapidly the exhalations of the human body and the germs of disease, and then in turn exhales these to be again inhaled. The earth under a house tent occupied by from 4 to 6 men will absorb sufficient effluvia in a few days to poison the earth and atmosphere under those tents. On entering the door of one of those close tents in the morning at sick call the atmosphere will be found disgustingly fetid and offensive. The house tent, when its sanitary condition is neglected and it is permitted to occupy one position for days and weeks, is responsible for an infinite amount of disease, but at the same time, by proper sanitary care, can be made not only comfortable but wholesome. In this particular I suggested a rule that was ever after carried out rigidly in our command, and resulted in infinite improvement in the health of the soldiers. In hot seasons every tent was struck after breakfast, and in cool seasons twice every week, its location thoroughly cleansed and the tents placed on the streets, and the former sites exposed to the action of the sun's rays and atmosphere for twenty-four hours. In this arrangement a double purpose was accomplished—the one hygienic, the other to give useful employment to the soldiers.

All débris collected was carted off and burned, so that no cause for septic influence should remain.

The next day the entire process was reversed.

By the rigid practice of this system our air and water were preserved uncontaminated. The second rule in importance adopted was the punishment of every man who used the surface of the earth for the deposit of excreta instead of the privy vaults, always located below the level of our water supply and at a distance from camp.

The excreta of all ill patients with typhoid fever, pneumonia, dysentery, diarrhœa, measles, were deposited in boxes filled with dry earth, to be carted off to the privy vaults twice daily. For the disinfection and deodorization of excreta I found the dilute sulphuric acid, when obtainable, efficient, and then the whole covered with dry earth. At the same time all horse stables and cattle pens were invariably located at a distance from and below the level of our water supply. By these sanitary arrangements we slept every night upon fresh ground, we had pure water for drinking purposes, and pure air for breathing purposes. We had a clean encampment—almost as clean and sweet as a fresh camp of an army in motion. And we had ample exercise for mind and body.

By this unremitting attention to the laws of health our command became a model of healthfulness and cleanliness. I became convinced that nothing but the direct chemical action of solar light and heat were capable of destroying the infectious exhalations of the human body, either sick or well, when absorbed by the earth's surface, on which these bodies habitually repose. I found that at least twenty-four hours exposure was necessary to accomplish this object. I instituted a series of simple experiments to test this matter. When each tent was struck, a small portion of earth in its inclosure was excavated to the depth of two inches, and when applied to the nose, after a tent had been erected for several days, was always found to give forth a more or less offensive odor. The action of the solar heat and light invariably dissipated these odors.

Education, intelligence, refinement, among soldiers exert a marked sanitary influence over their general health. The Confederate army was composed of companies and regiments of the most opposite extremes in these particulars. Some educated and refined in the highest degree, while others were steeped in the profoundest illiteracy and ignorance. To reconcile these diverse elements was a difficult matter. There was far less disease among the educated and refined than among the opposite classes. The former resisted the attack of disease more certainly, and recuperated from its ravages more readily. A company of soldiers who made their signature to the pay roll largely with a cross mark were sure to suffer much from disease.

The educated had more pride, self-respect, good taste, and ambition in attending to all the hygienic laws of life and in the preparation of more palatable, digestible, nutritious varieties of food, while the illiterate volunteer can not be made to comprehend the dangers of dirt and filth, or the importance of cleanliness in all things to health and life. Neither can his dull intellect understand why one method of preparing his food should be more conducive to digestion and health than another. He burns his bread and fries his food saturated with grease, and suffers from indigestion, colic, and diarrhea, but is ignorant of the cause. In the practical hygiene of armies a question of vital importance is the disposition of all excrement, human and animal, so as to prevent pollution of air and water. This is eminently true of the excreta of patients with typhoid fever, dysentery, and diarrhea.

In the Confederate service I at once saw that the more scrupulous attention that was paid to this subject the better the health of the command, and as certain as it was neglected, the army suffered in proportion with septic disease.

After one of the great battles around Richmond, in the intense heat of summer, my brigade was assigned to a location covered with human and animal excrement, and in twenty-four hours there were hundreds of cases of septic diarrhea.

In military, as in civil life, it is surface drainage that pollutes our water supplies, and therefore in armies and camps there should never be permitted accumulations on the surface of vegetable, animal or excrementitial materials.

In my own experience I found that absolute cleanliness of a camp was always practicable by excavating privy vaults at a distance, located below the water supply level, and the rigid enforcement of their use by the men.

The artesian well, from 100 to 300 feet deep, if practicable, furnishes probably the most certain protection to drinking water against the contamination of surface drainage. It is my opinion that the artesian well, sunk rapidly, by the modern facilities for constructing such means for drinking water, in camp, would be a step in the direction of economy in the health and life of an army.

During the winter and spring of 1862, I was placed in a favorable position to observe the diseases of volunteer recruits, and the best methods of preventing their extension. During these five or six months I acted as surgeon of the camp of instruction, near Raleigh, North Carolina. In that space of time some 10,000 volunteers, under the conscript law, passed through the camp. Of these, about 4,000 contracted measles. I found that when a recruit had measles and was retained in camp, or sent to the front, he invariably passed through one or more of the sequalæ of the disease—as diarrhea, dysentery, bronchitis, pneumonia, and not unfrequently typhoid fever, so that he was either on our hands as an invalid, or in the process of disease finally died. To prevent these untoward consequences and for the purpose of breaking in upon this chain of morbid tendencies, I determined to suggest a universal system of furloughs for every man who had passed through an attack of measles, of from two to three weeks. Consequently during this period there were furloughed from this camp more than three 3,000 soldiers, and the results were admirable. This method had the effect of absolutely correcting the evil. The diseases consequent to and traceable to measles cost the Confederate army the lives of more men, and a greater amount of invalidism, than all other causes combined, and if this method of general furloughs could have been adopted after

an attack of this disease it would have resulted in preventing a vast loss of life and time, and would have proved a decided measure of economy.

In the month of February there appeared in this camp of instruction an epidemic of cerebro-spinal meningitis that threatened at one period to disorganize the camp. The type of the disease was so exceedingly malignant as to prove fatal in three-fourths of the cases, in opposition to the most approved methods of treatment then known. It appeared first in a company of recruits who came from a certain county in the State of North Carolina, where the disease had been prevailing as an epidemic, and then rapidly extended to other recruits in the camp. The disease appeared in several different forms—as the comatose, the convulsive, asthenic and collapsed, and the ataxic.

The course was usually rapid when fatal, and the few cases that recovered convalesced slowly, and ever after remained unfit for military life. How to prevent the extension of this epidemic, more fatal than Asiatic cholera, became a serious problem for solution. In relation to the prevalence of this epidemic and its peculiar history, I desire here to note two important points; one is that the disease was imported from a section where it had previously prevailed, and that it was eminently infectious. All recruits who came in contact with these patients suffering with the disease, from this infected district, contracted the disease. Even those inhabiting tents in the vicinity of the sick contracted it.

The second point is, that by a rigid system of quarantine, or in other words, prompt separation of the sick as soon as attacked, and his absolute isolation in a camp at a safe distance were the only means capable of arresting an epidemic more fatal than Asiatic cholera.

Occupying only a secondary place to measles, diarrhœa was the bane of the volunteer recruit of the Confederate army. Nine-tenths of all new recruits suffered from an attack of diarrhœa. While these attacks were not in themselves fatal, they were the cause of a large amount of invalidism, and laid the foundation for other diseases that were often fatal.

How to prevent these cases of camp diarrhœa, and render the acclimatization to camp life easy and healthful, was a serious question of hygiene.

The new recruit when he entered the army left behind him his accustomed system of diet and took up a new one entirely and radically different. He left a mixed diet, vegetable and animal, and a fair method of preparing it, and took one largely animal, usually very badly prepared, which was resented by his digestive organs. He left an animal diet, cooked in the boiling pot, the baking oven, or the stew pan and substituted the frying pan for all of these.

The undisciplined Confederate naturally sought the quickest and readiest method of cooking his meals, and that was by the frying pan. This culinary utensil cost the Confederate army a vast amount of invalidism, and indirectly many lives.

It would ruin any army. But as time wore on and the mind of the soldier gained wisdom by experience, the stew pan was substituted for the frying pan, and then animal and vegetable food, when obtainable, were prepared together into a mass that was not only more savory, but far more digestible and wholesome, and thus much of this diarrhœa became a thing of the past. My experience in the treatment of the wounded, of infectious cases, as gangrene, erysipelas, typhoid fever, pyæmia, in hot seasons under tent flies, alone in high dry locations under shady groves, where the breezes had full sweep, was far more favorable in result than in crowded hospitals or tents.

In conclusion, Mr. President, it can be said in all truth that, in army life as in private life, the good results of systematic cleanliness, pure and simple, of method and thoroughness in its application, stands alone, and ever will do so, as one of the most potential, if not the most potential agent for the prevention and cure of disease at our command. In my own personal experience in military and civil life I have on many occasions, I could not say how many, seen the marvelously good effects of

systematic cleanliness in clearing up endemic and epidemic disease, in preventing its extension and ravages. On the contrary, I have as often seen a want of care and inattention to cleanliness cause infinite trouble in the evolution and propagation of disease.

Cleanliness is one of the most conspicuous and prominent attributes of civilization, and it stands conspicuously as a landmark between civilization and barbarism. Our barbarous ancestors in ages past were decimated year after year by the most horrible and dreaded epidemics of pestilence. A want of cleanliness, pure and unadulterated filth, lay at the bottom of it all. There can be no civilization, no enlightenment without cleanliness, and the more filthy we become the further we descend on the down grade to barbarism.

Upon the close of the discussion of Dr. Brown's paper by Dr. Reyburn the following paper was read, Dr. Bedford Brown being in the chair.

THE CAUSES AND ORIGIN OF CONTINUED FEVERS, WITH REFERENCE TO NAVAL AND MILITARY SERVICES.

By Surg. C. A. SIEGFRIED, U. S. Navy.

The large amount of loss in life, strength, and efficiency in armies and navies, from the constant prevalence of continued fevers, is my excuse for presenting the following study on their causes and origin. From an experience gained under many different conditions of climate, environment, and service, I have become impressed with the importance of certain factors of causation among bodies of men under military and naval discipline, and under constant observation.

In the study of the phenomena as a whole, and their influence on mortality rates, abdominal typhus, or typhoid fever, furnishes the type for an analytical study, and of a morbidity that warrants the closest attention and endeavor toward a clearer appreciation of the causes and origin, the management, and its possible prevention. Aside from ephemeral or irritative fevers from various evident causes, the paludal fevers, and those common in regions coming under civilized man's domination for the first time, continued fevers are essentially diseases of aggregated humanity; they are contemporaneous with communal living, the customs, habits, social conditions, and appurtenances of civilization; also, and which is much the same, in circumstances of unusual crowding by a few, or even a single individual, confined to one spot or locality under certain conditions. They are prone to inflict the crews of ships in the Old World harbors, or in those waters which have for centuries received the wastes and sewage of cities; and at this moment they are the paramount causes of loss in all modern military forces. In former times, before the application of the principles of hygiene, the acute form—typhus exanthematicus—was a constant attendant upon life in the limited quarters of ships and old garrisons.

The argument I take the liberty of bringing forward here is that continued fevers, accepting Murchison's classification, some of the tropical fevers, Mediterranean fevers, and the class of "simple" continued fevers are all of similar origin, differentiating only finally and becoming the types as known to us, when the specialized microphytic elements concerned have gained the power, and virulence, of continuing their kind as such. This contention may be said to have been laid aside for the last twenty-five years in view of the pathological lesions involved, strongly marking some types, the character of symptoms, and quality of infection.

Up to within fifty years ago the ablest physicians made little distinction in continued fevers, the cases mingled alike in the hospitals, even as cases of diverse types mingle now; the common resemblances were the same, the mortality was equal in degree with the same variations according to the prevalence of type; and it was only in the quality of infection, and by the *gross lesions*, that distinctions came at first to be made.

What becomes of these "specific differences," when one observes closely the dying embers of a typhus visitation as compared with the great majority of cases of continued and typhoid fevers, cases with pyrexia lasting to twenty or more days, with or without any one or all of the symptoms usually associated with the so-called enteric fever? Is there a marked difference in mortality, symptoms, contagion and morbid lesions? Customarily, when the abdominal symptoms are pronounced, the label is "enteric fever." It is well known that we can not draw sharp lines in the vast majority of continued fevers, and this becomes possible only when the process has far enough specialized to form the types—the enteric lesion on the one hand with the association of the Eberth bacillus, and the putrid blood condition with exanthematous skin on the other—typhus. In all forms of continued fevers, however, there is a constant apparent blood change, eventuating in severe cases in disorganization, deposition of dissolved hæmatin, the cell protoplasm having lost cohesibility as a rule—the proteids of the blood tissue being under the disintegrating influence of new substances circulating in that fluid—derivations of illy formed leucomaines and enzymes.

We are taught that typhus exanthematicus, in contradistinction to typhus abdominalis, is an acute, infectious fever, characterized by sudden onset, a dark-red eruption, marked and peculiar nervous symptoms, and a termination usually by crisis at the end of the second week; that typhoid is an infectious fever, characterized anatomically by hyperplasia and ulceration of the lymph follicles of the intestines, parenchymatous changes in other organs, notably the spleen, and that contagion is not a marked feature. Since 1880 appears the Eberth bacillus. The eruption is rose-colored; there is probably diarrhœa, abdominal tenderness, tympanites, splenic enlargement, and much is said of the typical thermal curves. But it is well known that all of these symptoms are extremely inconstant—even the fever may be wanting; in fact, the expression is heard that "there is typhoid without symptoms." According to the character of the epidemic or the intensity of prevalence, so is the mortality and consequently the approach to specificity.

Concerning the other forms of continued fevers (excluding relapsing fever at this time), occurring at all times, with all ages and sexes, and often in connection with prevalent typhus and typhoid, before, during, or following their usual outbreaks, there is little to be gotten from the books. They seem to be characterless, and, being devoid of malignancy, gain admittance nowhere. Yet they very often present excessive pyrexia, and some of the symptoms suggest a serious prognosis; and, as a rule, they come to an abrupt termination within the second week.

In such cases, in my experience, there is little alarming excepting the threatening heart failure, which occurred in two fatal cases, observed by me, on the sixteenth and eighteenth days, respectively. Post-mortem section revealed unusually fluid darkish blood and a peculiar granular change in the substance of the heart muscle. There were no skin eruptions, enteric involvement, or marked nervous phenomena. Such instances of continued fever are not at all uncommon among the aggregated men of navies in temperate climes, and can not be passed over as being gastric or irritative fevers, or as referrable to conditions not diagnosticated. They are not always benignant, and they unerringly indicate an unhygienic environment. I believe them to be but species of the same genus or family (including true typhoid), a group of diseases mainly characterized by disordered heat balance and ataxia, a *mixed infection* of the economy, varying only in degree and sequelæ, yet based upon the evolution of the same series of causes, the same ultimate origin in excremental matters, resulting in new bio-chemical products, from necrotic change set up in the epithelial elements lining the digestive tube and the respiratory tracts; the work of a class of saprophytes introduced in unusual numbers from without, upon or within our various supplies—air, food, water, etc. The same causes, long continued, combined with misery and famine—thus diminishing immunity and resistance—specialize the types by added and increased virulence of the mycrophytic elements.

There are cases of typhus without eruption, cases of typhoid without follicular enteritis. All the numerous names—as many as eighty—for "typhic," or typhus fevers in the various parts of the world, are shown to be one and the same thing by Pringle and Fordyce; and, from well-known causes, they may become devastating and depopulating, whether in military forces or in civil populations; and when they decline we always see the large class of benignant unclassifiable cases.

There can be no doubt that anomalous cases occur, concerning which a diagnosis can not be given—there are no specific characteristics—and the term simple continued fever has become a refuge for these uncertain fevers. (Aitken.)

Dr. Murchison, in his great and classical study into the nature of typhus and typhoid fevers, leaves out 200 cases that could not be classified as either typhus or enteric cases. Wunderlich and Murchison both refer these anomalous fevers to combinations of the poisons of typhus and typhoid, and that the characters of each do not remain distinctive. Dr. W. T. Gairdner notes the many anomalous fevers which at times have quite overcome the number of typhus and typhoid types.

Dr. James Barr, Glasgow (Lancet, May 13, 1893) "objects to the term 'enteric fever,' as by it the lesion of the bowel is raised to the dignity of the disease, instead of remaining, as it undoubtedly is, the effects of the disease—an irritative chemical effect. These lesions are pathognomonic, but like other prominent lesions and complications are due to the specific bacilli and their products. He is not sure that the Eberth bacillus causes typhoid fever, but feels confident that no single ptomaïne could give rise to the very varied toxic symptoms characterizing different cases of the disease. In the majority of cases of the disease, the intestinal symptoms are not more prominent or more grave than those of the respiratory and nervous symptoms. *"Many most competent observers constantly mistake typhus, typhoid, and meningitis, at the present time."* Dr. B. A. Whitelegge (Lancet, March 18, 1893): "Occasionally in crowded manufacturing towns and villages we meet with typhus fever outbreaks which we can not suppose to have arisen *de novo*, but which seem to have had their beginnings in cases of illness which, apart from subsequent history of typhus fever, would have received no name more definite than febricula or simple continued fever." Mild forms of typhus occur among children in connection with such outbreaks (Mr. Spear), and Dr. Theo. Thompson suggests "the more or less universal existence of a specific organism which under ordinary conditions does not develop sufficiently to display its potential infectivity, but which under special conditions may so develop."

In Mediterranean latitudes, in the tropics everywhere, these anomalous, sometimes typically typhic fevers exist at all times. They receive various names, often from some local peculiarity or predominant symptom, and they may be found combined with paludal, bilious, and gastric disorders. The works of Morehouse and Ronald Martin give much information on the anomalous fevers of tropical and semi-tropical regions and of India. It is here that Murchison's doctrine, "pythogenetic fever," or fever of putrescence, is more clearly applicable, and these regions furnish us with cases requiring much more extended methods of investigation. They are of the utmost importance to science, for it must appear that the bulk of tropical and subtropical fevers are connected with the "typhic etiology." As a matter of fact, putrefactive and saprophytic organisms most abound in those regions of the globe, from the many well-known and apparently irremediable human agencies and effects present, mainly resulting from constant heat and moisture amidst, very often, degraded populations. I need not bring to bear the statistics of typhic disease on the shores of the Mediterranean, in Egypt, in India, and in similar regions. In temperate regions these forms of disease—"autumnal fevers"—follow the heats and trials of the hot months of the year, the same series of causes having been set in motion.

The tedious forms of continued fevers known as "Malta fever" and "Rock" or Gibraltar fever, have been investigated by Drs. Milnes (Lancet, January-August,

1892), Bruce and Hughes (Lancet, 3, December, 1892), of the English army, and by Dr. Gipps, English navy (Tran. Epidem. Soc., London, Vol. IX.) These observers have gone farther in their studies than any others who have labored in the same field, and their results are briefly as follows: The pyrexial condition is often chronic, lasting as long as four or six months, but with distinct remissions, not like intermittent. The temperature curves come in waves. Quinine and arsenic have no effect. There is obstinate constipation, progressive anæmia and debility, followed by neuralgic and rheumatic disturbances lasting for years. The death rate is low, but the time lost and the invaliding in the English services are enormous. The fever may be endemic and epidemic in character. Pathologically, the spleen is at first enlarged; the mucous linings of the alimentary tract are subject to irregular patches of congestion, not related to Peyer's patches. The mesenteric glands are enlarged, but less so than in pure enteric cases, and there is no malarial pigmentation. From the spleens of 15 fatal cases a special microörganism has been obtained. One observer, Dr. Louis Hughes, has carried the organism through 6 generations of pure cultivations.

Pure cultures have been introduced 4 times into the forearms of healthy monkeys (twice by Bruce and twice by Hughes) under the strictest precautions. No local changes took place, but the animals developed a similar fever. Two were killed in the third week, having a temperature of 106° and 107° F., and from each pure cultivations of the same organism were obtained from the spleen and liver, and in 2 from the spleen and blood. Enlarged spleens and irregular congested patches in the intestines were found in the bodies of the monkeys. Peyer's patches were normal. The organism was also carried from the spleen of one monkey to a well animal, again inducing the same fever, lasting over two months Thus, the three observers, agreeing essentially in most points, have placed the etiology of certain Mediterranean fevers on a sound basis. The organism believed to be the proximate cause of these fevers grows best in an alkaline nutriment medium, with an alkalinity not in excess of the blood, placed at 37°–40° C., preferably in 1 per cent peptone Agar. After inoculation from fresh human spleen the colonies will appear in five or six days as minute transparent, colorless drops on the surface, gradually becoming opaque. With transmitted light and low power they appear round, with granular edges, have an orange tinge, and without liquefaction. The colonies retain vitality for over two months. They die at 15° C., moist, but live a long time in the dry state. In the hanging drop the organism appears as a minute coccus (tending to cohere in very short chains), 0.008—0.3 mm. in size (Bruce); ovoid or nearly round, of rapid movement, and will stain readily. They can be easily found in fresh splenic substance after death, and in the blood, during life, of men suffering with the fever.

The originating and causative agencies are, by all observers of these Mediterranean, Danubian, and Red Sea fevers, put down as due to collections of fecal and organic matters, in porous soils oftenest, and infection is commonly believed to be by means of the atmosphere, and not by food and drink. As with so many and the most competent observers everywhere, regarding the typhic etiology, we have here again a "porous soil, human excrement, and a varying level of subsoil water."

The work of Dr. Pasquale, Studio Etiologico e Clinico delle Malattie Febbrili più Comuni a Massua, has cleared the Italian Red Sea littoral of the current ideas as to malarial infection. Among his conclusions he states that at Massaua "there is no fever infection, *sui generis*, such as climatic remittent, which some classifiers have called it. There are febrile maladies which might be confounded with common continued fevers, such as those arising from typhoid infection, principally of the so-called abortive and minor types." The Massawah or Suakim fevers are thus evidently of the same family as Malta, Neapolitan, Gibraltar, Cretan, and the other locally-named fevers common to the basins of the Red and Mediterranean seas.

Dr. G. H. Milnes, formerly of the English navy, summarizes the main points (Lancet, June 18, 1892), as observed by him of Mediterranean fevers, as follows:

These fevers are neither typical of typhoid or malarial fevers as commonly understood, yet they at times present symptoms of both in the character of the remissions of pyrexia, the congestions of the alimentary canal and the splenic enlargement, and the tendency to pulmonary congestions. Invasion is marked by loss of appetite, headache, backache, but seldom by rigors or vomiting. The rise of temperature may be gradual or sudden, oftenest reaching its highest point within the first four days. There may be a slight pulmonary or pleuritic congestion; slight jaundice may be present in a few cases; rheumatic symptoms are late manifestations; and, on the whole, the disease has no pathognomonic symptoms, excepting the tongue, which he considers typical. This organ is covered with a dead white, moist fur, persisting throughout the attack, and with its disappearance recovery has commenced. The bowels are constipated, and the abdominal symptoms are not very prominent. Enlargement of the spleen may or may not occur. The main features of the disease, if recovery does not take place within the first fortnight, are progressive debility and emaciation, and irregular temperature without rigors. Recovery is hastened only by transfer to cooler regions. The rarely occurring eruption is not exactly like the rose spots of typhoid. It is a disease of old, thickly settled towns and garrisons in warm regions and does not exist on open plains or in marshy regions. It is best treated with fluid diet, recumbency, early moderate calomel and saline purgation, and by hydrotherapy.

The English military and naval surgeons in Egypt state that "there are many fever cases of twenty-one days and longer duration, with no distinguishing characteristics, with thermal ranges common to true typhoid or enteric fever, but with no diarrhea, enlarged spleen, or skin eruption." Annually there occur in Egypt mild epidemics of typhus exanthematicus, following the season wherein the poorer natives huddle together in squalor and filth in crowded tents for warmth.

A similar class of low fevers, with symptoms and course not unlike those met with at Suakim and Massowah in the Red Sea, are common to the Black Sea region of the Danube, and though these Danubian fevers have, it is said, more rigors in their course (Lancet, August 13, 1892), a recent writer compares them to the Mediterranean fevers described so well by Dr. Hutchinson Milnes, they being neither typical of paludal disease or true enteric fever.

Thus, the common forms of Mediterranean and Red Sea fevers have but few distinctive characters, clynical symptoms, and negative lesions only, and according to the three above-quoted observers a specific organism is found in association in cases widely separated (Malta and Gibraltar) thus far, and which answers the requirements and postulates of Koch. Studies on the chemical products of the organism have not as yet appeared, and from such—much more difficult investigations—more valuable information as to the origin and pathology of these fevers is anticipated.

The diseases produced by the special poison or poisons of typhoid fever differ much among themselves. Some are so serious that life is almost inevitably destroyed; others are so trifling that patient and physician are in doubt whether there was disease at all. Between these two extremes, at every gradation, the lighter cases are often called a febrile abdominal catarrh, gastric fever, and so on, a custom practically not unjustifiable, and in numerous epidemics the imperfect cases are more common than the perfect ones. (Liebermister.)

With the discovery of the constant association of the Eberth bacillus with "enteric fever" or typhus abdominalis, it was hoped that a great practical advance in its etiology and in its management would be assured us. But twelve years have now passed, and knowing much of the biology, and even of the chemical products of that organism, it can not be substantiated that it has ever produced typhoid fever in experiments upon animals. I need not refer to the positive difficulty of finding the organism even in the excreta of many enteric cases, greater still in contaminated milk or water, and finally, the divergent views and beliefs regarding the etiological relation of the organism itself with typhoid fever. The Eberth-Gaffky germ in Germany is not the same as the one isolated by Babes in Buda-Pesth. Klebs describes the bacillus typhosus as large-sized filaments, 50 μ in length and 2 μ in width, without segments or ramifications; and Letscherich describes them as consisting of micrococci, either isolated in colonies or in chains, very dissimilar to those

of infectious pneumonia, but which by cultivation reach a size twice or thrice greater. The eminent French observers Rodet and Roux have stated very positively that the typhoid bacillus of Eberth—the now universally recognized type—is merely an altered and virulent form of the bac. coli. commune of Escherich. Pasteur and others have long ago shown that attenuations as well as heightened virulence of pathogenic germs is attained by artificial cultivations without the animal body in the one case, and by using certain membranes and fluids of living animals as media on the other. The experimental proof that typhoid fever is due to the Eberth germ is wanting; the association, however, is constant, and there is no doubt of its etiological significance.

According to Rodet and Roux, the bac. coli. commune, without losing its general botanical characters, acquires a toxic nature within the human organism and becomes, in fact, Eberth's typhoid bacillus. Ordinarily the bac. coli. com. exists in the human organism without injury to the latter, but can become highly virulent and infective when introduced into water. It is concluded from this that not only typhoid dejections, but simple fecal pollution of water may produce typhoid fever in those who drink it. According to Rodet and Roux, a harmless saprophyte acquires, by contact with water, new and infective properties, and an organism derived from fecal matter can exist for weeks and months in earth and water, and eventuate in the materies morbi of typhoid fever.

It is a matter of common experience to find this fever prevalent or endemic over soils long fouled and filth-impregnated, and the foremost hygienists living ascribe to ground air, entering dwellings, the principal infective agency. A water supply derived from superficial wells and drainage from such an impregnated soil is an equally potent infective agency. A porous soil overlaying impermeable clay, once filth-impregnated, is forever doomed to originate typhoid diseases, according to Cameron (Cavendish Lectures, 1892).

Rising and falling ground water, varying atmospheric pressure, with the seasonal changes of temperature, supply all the necessary conditions for the evolution of the microbic elements of disease and their access to human habitations. Once specialized, transference becomes easy with the methods of crowded modern life.

The entrance of the true typhoid poison is usually by the enteric lymphatic system. The initial change is proliferation of the follicular tissue of the intestinal mucous membrane and of the mesenteric lymphatic glands. The typhoid process is more inflammatory than hyperplastic; that is, the affected parts are from the first the seat of active congestion and infiltration with leucocytes. Whether the typhoid process ever goes on to suppuration is a matter of question, for certainly the lymphatic glands, which are its principal seat, do not suppurate in the early stage of the disease, though in prolonged cases suppurations are among the most formidable of its consequences. These are by pathologists regarded as secondary. They are infective inflammations of typhoid fever, but not specifically so. They are due, not to specific poison, but to the diminution of the alexeteric power of the organism, by which the common phlogogenic or pyogenic microphytes are able to get the upper hand. This is not fancy, but fact, for whenever in typical fever the tendency to suppurate manifests itself, we find that, in the subcutaneous and submucous infiltrations which occur, the microphytes which are present have no special relations to typhoid fever, but are the common and specific class of suppuration organisms, "chain and cluster cocci." The bearing of this is that the cause of typhoid fever must be sought for in the early stages of the disease and in the tissues primarily affected, the mucous membranes and lymph glands of the intestines. (Sanderson.)

Welch has, however, found pure cultures of the Eberth germ, in cases of typhoid, seated at the ribs.

Prof. Victor Vaughan, in a paper read before the Association of American Physicians, May, 1892, regarding some germs from a drinking water, the consumers of which furnished cases of typhoid, states that "in their effects upon the lower animals these toxicogenic germs are fully equal in virulence to the Eberth bacillus." The post-mortem appearances in animals dying after inoculation with these germs are practically identical with those observed in animals killed by inoculation with the Eberth germ. "Two of these toxicogenic germs form on potatoes invisible growths,

when taken from cultures in human spleen which have been kept at a fever temperature for some days. The fourth toxicogenic germ, when taken directly from water, forms an invisible growth on potato." "If we add to these the fact, well known to bacteriologists, that there are marked morphological and culture differences between Eberth germs from spleens in different epidemics of typhoid, and that the most skillful bacteriologists have reported diversely upon the reaction of the Eberth germ with staining reagents, the evidence becomes sufficient to convince me that the Eberth germ, as found in the spleens and other organs after death, is not a specific microörganism, but is a modification or involution form of any one of a number of related germs." The bacillus venenosus of Vaughan is identical with the so-called typhoid bacillus, and the germs found by him in spleens, after death from typhoid fever, differ from the typhoid bacillus obtained from Berlin and from one another as markedly as his "bacillus venenosus" differs from either or both.

By the most recent and reliable reports the pathogenic action of typhoid bacilli in animals agree, as a rule, in being in the nature of an acute intoxication, the organism being generally distributed in the body. If previously to the inoculation of the typhoid bacillus, soluble products or sterilized cultures of other bacteria—as for instance of streptococci, proteus vulgaris, and the colon bacillus—were injected, an intensified virulence attended the action of the typhoid organism (Annâles de L'insti. Pasteur, November, 1892). Inoculation experiments with both typhoid dejections and pure cultures of the Eberth bacillus have universally been without success. The few experiments in which a typhoid disease has followed inoculation or feeding have been made with impure material containing other active bacteria. It is known that a group of widely distributed organisms, which are, however, wholly different from the typhoid bacillus, have the power, when injected subcutaneously or intravenously, of producing in animals death with marked swelling and ulceration of Peyer's patches. (Flügge.) Neuridine $C_{15}H_{14}N_2$ elaborated by pure cultures of the Eberth-Gaffky bacillus only becomes poisonous to animals upon being mixed in the cultures with other putrefactive amines or alkaloids. If, with the formation of leucomaines in the fluid tissues there goes prompt oxidation, as for instance in the lungs, their poisonous effects are not exerted.

Some years ago, 1872–'75, when serving on a vessel of the U. S. Navy, the following conditions and consequences were noted. A wooden corvette had been for eight months out of use, lying in a fresh-water stream. In the summer months a large number of mechanics were employed upon her, making extensive repairs. In the month of November she was put in commission, and about 300 men were suddenly put on board in raw, inclement November weather. The ship was not clean, the men were not of the best material, and in much confusion they took up their abode in an unclean, steam heated (in parts) damp ship. It required many days of scrubbing to clean up the decks and dark corners, and all this time overcrowding, moisture, lack of sufficient ventilation, and somewhat irregular discipline and confusion among the crew reigned. Within three weeks there occurred six cases of continued fever, with macular eruptions, mousy odor, meningeal congestion and inflammation, mucous hemorrhages, and with a mortality of 33 per cent. The cases were not typical typhoid or typhus, and somewhat resembled cerebro-spinal meningitis. From a cold northern port the ship proceeded to a warmer southern port, where, during January, 1873, within ten weeks of the reception of her company, there were sent to hospital twenty-two cases of irregular fevers and rheumatism, including six cases of typical enteric fever, with a mortality of 23 per cent. With the lapse of time and improved hygiene, and an outside temperature allowing of free ventilation, all irregular fevers declined, pneumonias ceased to become typhoidal, and the simple continued and ephemeral fevers ceased altogether by the following summer. The cases followed upon the evolution and multiplication of ordinary saprophytic organisms becoming pathogenetic (following Drs. Woodhead, Roux, and Rodet) from moistened, heated, filthy decks in a confined atmosphere. I found developed under my eyes irregular, low, and con-

tinued fevers, with petechiæ, nosebleed, stupor, meningeal and lung involvement, and the enteric lesion among the symptoms of a certain proportion of cases; and, along with these, a number of mixed and milder continued and negative fevers, hovering like a nimbus over the others better characterized.

I have frequently found seamen to become ill with these irregular filth fevers, from among the crews of boats which, owing to the nature of their duties, were much delayed at city wharves near sewer exits, and only rarely were these cases typical of enteric fever. I have had two fatal cases of continued fevers of a negative character, and found at the end only a granular heart muscle and an excessively dark fluid blood; one dying on the 16th and the other on the 18th day and by heart paralysis.

Finally, I have found less fever the cleaner, dryer, and lighter the ship; in other words, no continued fevers in the absence of putrescence and its teeming microörganisms. Ships' crews consume as a rule only distilled water; all food, if anything is overcooked, and all drains go directly overboard. In the instances above cited the disease processes originated by the medium of the air by acting on the blood in the lungs, and on the intestinal linings by means of the food supplies in contact with such air.

With change in quality of respirable air come disorders and change in the physiological capacities of the lung chemistry (the exchange chemistry of the red cells when blood is exposed in the air cells), with sequence of disordered metabolism in the cells of the tissues in detail, ending in formation of new products and compounds derived from proteid molecules (ptomaines and leucomaines). This is followed by the setting up of new phenomena in vital activities (excess or loss) of function, excitability, irritability, degeneration or necrosis, the prominent phenomena being excessive metabolism and disordered heat regulating function—"fever." Blood being a living tissue, its cells and formed elements ever changing themselves, and performing varied and complex processes throughout the whole body, is the first constituent to undergo change when exposed to the evil influences of excremental emanations; or equally so when exposed to the same elements dissolved in water and food supplies and absorbed from the digestive tube. Prominent among the instances recorded of the origin of continued fevers, from street and soil emanations, from water and milk so polluted—originally human excretal deposits—confirmatory of this view, are the recent exact and accurate records of Roux and Vaughan; the former, the Lyons cases of typhoid, from the use of a drinking water containing the common colon bacillus; and the latter, the series of cases from the use of a lake water, fecal polluted, and markedly contaminated with "toxicogenic" organisms. (American Journal of Medical Science, August, 1892.)

Fever means an increased tissue change and has its immediate cause in alterations of the nervous system. (Virchow.) It follows the introduction of abnormal or unusual agencies (chemical products) in the fluid tissues of the body. Excessive molecular metabolism, oxidation, hydration, ferments, toxalbumoses, fibrins, etc.; also disturbing vaso-constrictor and vaso-dilator centers—skin, glands, central arterial system, changes in blood volume. It may follow direct poisoning of the nerve centers. It follows epilepsy, paralysis, fear, agitation, catheterization, and puncture of the corpus striatum—but here combined with disordered respiration.

The final compounds in the formation of heat, and in the transformation of chemical compounds, are H_2O, CO_2 and urea; and the amount of heat formed must go, *pari passu*, with the amount of these excreta. (Ziegler.) In other words, pyrexia ensues upon several conditions—from excessive formation of poisonous substances in the body, or their accumulation due to deficient elimination, or the inadequacy of some organ whose function is to convert harmful into harmless bodies; or from poisonous substances infiltrating from tissues into the blood current. Fibrin ferment, normally held in combination in the white blood corpuscle (Schmidt) may be liberated and readily excites fever, as in the course of aseptic surgery. Fatigue and exhaustion

fevers may be of this class. Fatal ferment fever is produced in animals by injecting peptones. Parenchymatous degeneration of the muscles and large organs, hemorrhages in the intestinal canal, Peyer's patches and mesenteric glands are found.

The well-known poisons of the intestines or toxic alkaloidal bodies, some with an affinity for the central nervous apparatus, are due to the bacteria present, and the typhoid state may be charged to the mixed infection following their absorption. Some leucomaines of themselves and other converted by bacteria into definite toxic bodies, as Methylguanidine, when sprinkled upon exposed areas of the brain periphery readily excite convulsions. (Vaughan and Novy, ed. 1892).

The physiological facts in fever, according to Dr. T. J. Maclagan's "metabolic theory," are as follows: Two main processes are constantly going on in the system, constructive and destructive metabolism. During tissue disintegration various products destined for elimination are formed, urea, CO_2, and heat. Urea is eliminated chiefly by the kidneys, CO_2 by the lungs, and heat by the skin. In the case of each, production and elimination are so well balanced that no accumulation takes place in the system. In the case of heat this balance is so well maintained that the normal temperature is always the same, (98.4° F.) The various processes are presided over by the nervous centers, and it is by the regulating power of these centers that the normal balance is maintained. In fever this whole process is disturbed, there is increased formation of urea and CO_2, and the temperature rises above 98.4° F.

The thermal apparatus, according to Maclagan, is composed of—

(1) The tissues, particularly the muscles, in which heat is formed.

(2) The surface, from which heat is eliminated—skin 80 per cent, lungs 20 per cent.

(3) A central controlling power in the nervous centers.

(4) Nerves connecting this with the heat-forming parts of the body.

(5) Nerves connecting heat centers with the heat-eliminating surface.

Dr. Macalister (neurotic theory of fever) describes the thermal-nervous system as consisting of three parts: (1) The heat-adjusting mechanism, "thermotaxis;" (2) the heat-producing mechanism, "thermogenesis;" (3) the heat-discharging mechanism; "thermolysis." Disorder of the first implies irregularity of temperature; of the second, heightened temperature; and disorder of the first, second, and third implies excessive fever, dangerous increase of heat, and steadily rising temperature. These three centers are only found in the highest developed animal life. Cold-blooded animals possess a thermolytic mechanism—a nervous mechanism controlling the vessels and breathing only. In young mammals the theremogenetic system is developed before the thermotaxic.

Dr. Macalister, hence, looks upon fever as a dissolution—a relaxation of control from above downwards; thermotaxis is the first part of the mechanism to be disturbed and overthrown; thermogenesis then becomes more and more excessive; and lastly, the thermolytic mechanism fails to act.

These two theories supplement each other. The heat centers may alone be diseased; or, the exciting cause continuing, the whole organism may partake of a slowly spreading disorder of metabolism—an infective fever. A certain amount of pyrexia is by many held to be necessary to restoration of function in some forms of fever.

In fever there is wasting of nitrogenous tissues, increased consumption of H_2O, increased elimination of urea, increased rapidity of circulation, and preternatural heat. The presence in the blood of vast masses of living organisms, with their changing structural protoplasm and new chemical products, would seem to account for these phenomena of fever. Microörganisms reproduce and multiply in vast numbers, and consume a large quantity of N and H_2O. Voit has distinguished between the fixed or organ albumen, which enters into the composition of the solid tissues and changes slowly, and the circulating, or store albumen, which is contained in the blood and fluids of organs, and very rapidly undergoes change.

This circulating or store albumen consists of two parts—a constructive part,

destined for the nutrition and building up of the tissues, and a retrogressive part derived from tissue waste and destin d for excretion. The former is converted into solid nitrogenous tissue; the latter into urea in the urea-forming glands, and as such is eliminated chiefly by the kidneys. The constructive store albumen is the source whence the "contagium vivum" would by preference naturally take its nitrogen, and so the tissues are starved in fever. The protoplasm of this contagium consists mainly of water, and for its growth a large consumption of water is required. This is drawn from the tissues and at the same time the water taken in by the patient is appropriated by the contagium—the multiplying microörganisms. Hence the dry skin and the parched mucous membranes of fever, as well as the inordinate thirst and loss of appetite, the scarcity of urine, and the constipation. The ingestion of water greatly increases the interstitial metamorphosis of tissue and consequent loss of weight; decomposed tissue is excreted partly in the urine and partly in solid fæces, and water formed in the organism by the change of tissue is augmented, as well as the nitrogenous constituents of the excretions. (Bocker, Brit. and Foreign Med.-Chir. Rev., Vol. XIV.)

Pflüger's views, in opposition to Voit's, assume that the proteid matter of the cell itself, "the organ albumen," undergoes decomposition the more readily; and recently Schöndorff (Archiv f. d. gesammte Physiologie, Band LIV, p. 420) has shown that the rate of decomposition of proteid matter in a tissue depends upon the nutritive condition of the cells themselves and not upon the content of albumen in the blood, lymph, and other fluids bathing the cells. But though the organ albumen may play the leading part in proteid matabolism of normal nutrition, the store albumen would seem to be still the most vulnerable and apparent pabulum for the suddenly acquired microörganisms, the "contagium vivum." J. Meyer's investigations (Hofmann and Schwalbe's Jahresbericht, 1881) show that when the tissues are full of disintegration products, the effect of water in increasing elimination is very marked, and that upon the wasting processes of the body the water exerts no influence.

Dr. H. C. Wood, quoting the above, adds, "that while we can not by water produce tissue disintegration, we can by it wash out the retained products of tissue change."

In conclusion, I may add that the present generally accepted treatment of continued fevers, based upon scientific principles, is becoming more and more successful. A certain number of cases are unquestionably aborted by the cautious use of internal antiseptic remedies and calomel; most cases are benefited by the ingestion of much water, and the greater percentage of all ca ses are successfully treated by the system of baths and hydrotherapy.

REMARKS OF CAPT. L. A. LAGARDE, ASSISTANT SURGEON, U. S. ARMY.

Mr. President and Gentlemen: I have seen some typhoid fever in the West, at isolated posts where I was serving, which puzzled me in many instances, in the beginning at least, as to whether I was really dealing with typhoid fever or with some form of malarial fever. They would not show the significant signs of typhoid fever as laid down in the books. I shall take the greatest of pleasure in reading Dr. Siegfried's paper, as I am very much interested in the subject. These cases of regularly continued fever can be converted into genuine cases of typhoid under certain circumstances. I have seen men who showed very little or no fever for days, and then it would be suddenly developed. To illustrate this, I had a corporal who would not take advice, and when he did, he did so in a very surly way. He had a light fever and was getting along very well, but thought that I was keeping him confined unnecessarily and grumbled, so that finally, out of supposed kindness, I told him he might get up and have the privileges he complained were denied him. It lasted two days. At one of the morning rounds I found the man in bed collapsed. The fever was high, and I then realized what I had been dealing with. This regularly continued fever

that puzzled me before, I had converted into a genuine case of typhoid fever—so far as symptoms were concerned, at least—and the man died from it.

These cases occur in the practice of all physicians, and until we know from experience positively what we are dealing with, it is better to regard them as typhoid fever and treat them as such.

REMARKS BY MAJ. JOHN VAN R. HOFF, SURGEON, U. S. ARMY.

MR. PRESIDENT AND GENTLEMEN: On the plains in our Western country they have a continued fever which is known by a variety of names, depending upon the location. In Texas it is called the "Rio Grande" fever, and further north the "mountain" fever, etc., but in all the cases that have fallen under my personal observation the symptoms are almost identical. There is nothing absolutely typical of typhoid, and yet occasionally we get a decidedly well-marked case. It is observed that in these cases quinine will have no effect whatever; the temperature is usually not excessive, but persistent for several weeks; adynamic symptoms are not marked, and we have a continued fever which is at least typhoid in character.

About fifteen years ago, while I was serving in Wyoming, a regiment of cavalry went north into a country that had practically remained unexplored by white men from the time that Columbus discovered America. It had always been Indian country and mostly occupied by the Sioux. This command went into camp upon a creek of pure mountain water, cold as ice, flowing from the Wind River Mountains, and remained in camp absolutely beyond all contact with civilization for six weeks. In the autumn it passed through the post at which I was stationed and left five cases of fever which, for want of a better name, we called "mountain fever." Being very suspicious as to the true character of "mountain fever," and having made up my mind that it really must be a specific (possibly a hybrid) fever, in order to get a clear view of the situation, I treated all these cases tentatively. In a few days one man died from peritonitis, which an autopsy showed to have followed the perforation of an intestinal ulcer, and all the typical lesions of typhoid were found. The others recovered. I diagnosticated the disease as typho-malarial then, but to-day would pronounce it typhoid fever.

I have had no opportunity to determine what microörganisms are present in the blood of patients suffering from mountain fever, but assume from the inutility of quinine in those cases I saw that the *Plasmodium malariæ* would not be found.

The following paper was then read.

LAWS OF GROWTH OF BACTERIA APPLIED TO ASEPTIC SURGERY.

By ROBERT REYBURN, A. M., M. D.,
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It has been well said by a great operator that every surgical operation is a study in bacteriology. There will be found we believe, at the present day very few surgeons who will gainsay the above statement, and yet it may be worth our while to examine the question whether our surgery, as practically carried out, is in perfect accordance with the laws of bacterial growth, which is the underlying basis upon which aseptic surgery has been built. To return to elementary principles, let us inquire what are the three essential conditions favoring the growth of bacteria and other microörganisms. The answer, of course, that would be given by every tyro in surgery, would be the well-worn statement heat (temperature, say 100° F.), moisture, and atmospheric air. In other words, the conditions which favor the growth of bacteria are precisely the same conditions that are essential to the growth and repair of all the tissues and organs of the human body.

The logical sequence of this results in the following statement, viz: That no treatment of the tissues or organs of the body involved in surgical operations can be

successful which seeks by the action of powerful chemical agents to destroy bacteria in or around wounds; for if powerful enough to accomplish that object, the tissues themselves must be destroyed or injured.

A surgical operation is to a certain extent the opprobrium of medicine, for in having recourse to it we thereby confess the failure of our science. The ideal surgical operation, therefore, is one that removes the diseased or injured portion of the body with as little disturbance of the normal conditions of the tissues as possible. Repair without inflammation is, as all know, the motto of modern surgery. How preposterously absurd, therefore, is it for us after having removed, let us say, a tumor, or limb from the body to douche the seat of the operation with a solution of mercuric chloride or other powerful irritant, producing necrosis of the tissues and thus preventing the very end we seek to attain.

Notwithstanding the profound respect that all surgeons feel for the work and self-denying labors of Sir Joseph Lister, yet there can be no questioning the fact that the theory and practice of antiseptic surgery are rapidly being abandoned, and the more perfect science and art of aseptic surgery, is being substituted in its stead.

To Prof. Lister we owe the grand idea of excluding the bacteria and other germs from wounds, thus creating the then new science of antiseptic surgery. It is perfectly true that aseptic surgery, as now practiced in this country and in Europe, is very different from and far superior to the cumbrous procedures and dressings devised and practiced by the father of antiseptic surgery. The carbolic spray, once universally applied, has been almost entirely abandoned, and during my recent visit to Europe I never saw it once used. The many layers of protective gauze, mackintosh, etc., are now replaced by a simple layer of iodoform gauze, with an abundant layer of aseptic cotton firmly retained by bandages.

Another remarkable change is in the growing disbelief in the efficacy of the ordinary antiseptic solutions when used as germicides. A solution of carbolic acid has been shown to be a weak germicide, and the same may be said of a solution of boric acid, and of the other solutions used commonly for this purpose. Mercuric chloride has until the present time been our sheet anchor as a germicide. As we lost our faith in one germicide after another, we thought we could rely on that. Yet the iconoclasts are busy in their work of tearing down all idols in medicine, and now they have not left us this one. Recent investigations carried on at Johns Hopkins University (published in the Johns Hopkins Hospital Bulletin of April, 1891, pp. 50-60) by Dr. A. C. Abbott, on "Corrosive sublimate as a disinfectant against staphylococcus pyogenes aureus," on page 59, at the close of a very elaborate series of investigations on this subject, he says:

It is seen that under the most favorable conditions a given quantity of corrosive sublimate has the property of rendering inert only a given certain number of individual organisms.

Ibid., page 60, he summarizes his results in the following words:

In the light of these experiments and those of the experimenters quoted in this paper, it is plain that for use in surgical practice the solutions of corrosive sublimate do not possess all of the advantages hitherto attributed to them. * * * To the employment of sublimate solutions upon wounded surfaces it is plain there exists at least two serious objections: First, the albumen of the tissues and fluids of the body tends to diminish the strength of, or indeed renders entirely inert, the solution employed; and, second, the integrity of the tissues is materially injured by solutions of this salt.

Investigations made at the University of Michigan (published in the Medical News of October 1 and 8, 1892,) have shown that solutions of mercuric chloride, when used as a germicide, are often inert and still oftener actually injurious to the tissues when applied during surgical operations.

Dr. Charles T. McClintock gives in the above paper (Medical News, October 8, 1892, p. 399) the following summary of his experiments, viz:

(1) The high rank heretofore given to corrosive sublimate as a germicide is without warrant and was based on faulty experiments.

(2) The very varying power of resistance in different cultures, as pointed out by Esmarch and insisted on by Graber, is an all-important factor to be noted in determining the germicidal power of any agent.

(3) That sublimate forms with cellulose, as cloth, filter paper, etc., with silk, with albuminous bodies, with some part of bacteria (probably the envelope), a chemical compound that can not be removed by any amount of washing with water.

Thus the sublimate, when acting upon a germ, forms a capsule around it that protects the germ for the time from the further action of the sublimate, and in turn forms an impenetrable barrier to the growth of the organism unless it be removed. This barrier may be removed with salines, and is more rapidly removed in proportion to the renewal of the salines, conditions that are fulfilled in the circulating blood.

The above-named experiments would seem to warrant the expression of the opinion that the use of solutions of corrosive sublimate in surgical operations should be limited to the cleansing of the surface of the part to be operated on, and to the disinfection of the hands and arms of the surgeon; and furthermore, that such solutions should never be applied to surfaces denuded of epithelium or cut surfaces of the body made during surgical operations.

Antiseptic surgery endeavors to destroy the microörganism in and around the wound, and thus prevent its development. How futile this effort must be when we consider that these organisms are everywhere and at all times present with us. They are in every breath we draw, in much of the water and in many of the articles of food that we consume, and, indeed, exist always in the alimentary canal and all parts of the body exposed to contact with the air. But, on the other hand, it must be remembered that there are bacteria and bacteria. There are some species of bacteria which, when planted in a wound, will bring forth as the result of the poisonous materials formed by them, the formation of pus with the resulting septic fever, just as certainly as the acorn when planted and nourished will develop into the sturdy oak. There are other species which, when they come in contact with a wound, are practically harmless. Of course we can not with the naked eye distinguish between the poisonous bacteria and the harmless ones, and hence our only safe plan is to, as far as possible, exclude them altogether from wounds, whether made by violence or during surgical operations. How can this be done? The first point to be observed is, to use as little water or watery antiseptic solutions as possible in contact with the wounds made during surgical operations. The reason for this course is that by so doing we remove one of the essential conditions necessary for the development of bacteria and thus prevent or at least hinder their growth.

It is of course practically impossible to diminish or prevent the growth of bacteria in a wound by either raising or lowering the temperature of the wounded parts, hence we can only endeavor to accomplish this object by making use of the other two methods of limiting bacterial growth, viz., to keep all wounded surfaces as dry as possible, and exclude them from the action of the atmospheric poisonous germs during the process of repair.

Simple and self-obvious as these principles of treatment may appear to be, yet they are largely neglected and ignored by very many surgical operators at this very time. Often during an operation performed even by the most eminent surgeons, let us say an amputation, we see the field of operation deluged with a solution of boric acid, a solution of carbolic acid, or, worse still, a solution of mercuric chloride. This seems to be radically wrong in practice, and entirely inconsistent with the elementary principles of aseptic surgery. Of course, in operations which require the opening or removal of large suppurating cysts or cavities, it is necessary to wash them out. This should be done, we believe, with fluids as near the composition of blood serum as possible. That wonderful operator, Lawson Tait, of Birmingham, England, who has nearly completed his third thousand of operations upon the abdominal cavity, uses no fluid to wash out the abdominal cavity during his operations, excepting recently-boiled water.

For use in surgical operations the following fluids only are necessary, viz., recently-boiled water used tepid (about the temperature 100°, F.) and normal salt solution

(0.75 per 100, easily made by dissolving one ounce, avoirdupois, of common salt in a gallon of boiling water.)

Aseptic surgery, therefore, after all, is nothing but cleanliness, but when we say that we mean cleanliness carried to a microscopic degree of perfection, and far surpassing the ordinary ablutions by soap and water. What we endeavor to do at the present time, before any surgical operation, is to so thoroughly cleanse the patient, the surgeons, assistants, nurses, surgical appliances, and dressings (of course, including the hospital and all its surroundings), that no germs of poisonous bacteria can infect the wound and cause suppurating fever and perhaps the death of the patient operated upon. Modern surgery starts out with the assumption that in an operation aseptically performed, upon an aseptic patient and by an aseptic operator, there should be neither suppuration nor fever following. This, of course, is the ideal of surgery, which can not always be realized, but, nevertheless, it is the goal toward which we should aim and which we should always endeavor to attain. Every instrument and surgical appliance must be sterilized shortly before the operation, either by boiling in water, containing 1 per cent of carbonate of soda (commonly called washing soda), half an ounce to three pints of water, or by being exposed to a dry heat above the temperature of boiling water (from 230° to 240° F.) for one-half hour before the operation.

This can be done in the various patterns of steam and dry sterilizers which are now on the market, and can be procured at a moderate cost. But my principal object in writing this article is to call attention to the fact that aseptic surgery can be practically carried out without the purchase of any apparatus whatever. A tin wash boiler, which can be found in the humblest home, is just as good for sterilizing surgical instruments as Arnold's or other of the steam sterilizers now in use. A still more simple sterilizer for small instruments is the ordinary oblong tin baking pan, so familiar to our eyes in our youthful days. This pan, when filled with boiling solution of carbonate of soda, may not look quite so ornamental as a porcelain evaporating dish or a $40 copper sterilizer, but it will do just as good work. As before mentioned, to the above must be added absolute cleanliness of the operator, assistants, nurses, and in fact of all who come in contact with the patient. It is scarcely necessary here to say that the part operated on, and the arms of the operator, assistants, and nurses, must be thoroughly scrubbed first with soap and water and then with solution of 1 to 2,000 mercuric chloride just before the operation.

One incidental and very great advantage in operating in private houses (providing they are clean and in good sanitary condition) is that the germs of poisonous bacteria are, for obvious reasons, not so liable to be found there as in the air of crowded hospitals. In regard to the sterilization by the dry method, the only thing that is absolutely necessary to be purchased is a good thermometer, graduated to a temperature of 300° F. Of course it is convenient, and perhaps more surgical looking, to buy a dry sterilizing apparatus, but it is by no means essential. The oven of a kitchen range or that of an ordinary cooking stove will answer every purpose. Take a common pasteboard box, such as letter envelopes are packed in, place in the bottom of it a layer of aseptic cotton about 2 inches in thickness, lay on this your instruments and surgical appliances (bandages, etc.), with your thermometer, and your apparatus will then be complete. Place in the oven and expose to a temperature of 230° to 240° F. This temperature can be easily regulated by a little practice, and is lower than the temperature required for ordinary baking purposes, which is said to be 207° F.

Finally, allow me to add the following maxims: (1) Never use a drainage tube in a wound unless you are absolutely certain you can not get union by first intention. (2) If you have an amputation to perform ligate every vessel requiring it with aseptic catgut, silkworm gut, or silk; cut the ligatures off close to the vessels and leave them in the stump; close the flaps with similar sutures, and use no adhesive plasters in contact with the flaps of the stump. (3) After you have stiched up

the flaps, dust their surfaces with iodoform, boric acid, or subnitrate of bismuth. Place over this a layer of iodoform gauze, then an abundant layer of aseptic cotton, and over all this two layers, at least, of a well-fitting bandage. The reason why I do not use adhesive plaster in contact with the flaps of the stump is that it can not be properly sterilized and is very often the means of infecting the stump.

Above all things, never open a stump for ten or twelve days or even fifteen days after an amputation if the temperature of the patient is at normal point or even a degree above. The last limb I amputated was dressed for the first time on the sixteenth day after the operation. On the other hand, if the temperature goes up to 102° or 103°, open up the stump at once, and find out the cause of the trouble. At the Bichat Hospital (located in Paris, France), in August 1892, I saw a number of stumps of amputations which had only received two dressings, one on the fifteenth day and the other final dressing on the twenty-eighth day after the operation.

AFTERNOON SESSION.

Section called to order at 2 p. m., Executive President presiding.

In the absence of Dr. Stephen Smith the following paper was read for him by Maj. D. L. Huntington, Surgeon, U. S. Army:

SOME FACTS BEARING ON THE CONDITION AND SERVICEABLENESS OF THE STUMP AFTER AMPUTATIONS IN THE LOWER EXTREMITY AT DIFFERENT POINTS AND BY VARIOUS METHODS.

By STEPHEN SMITH, M. D., of New York.

During the latter years of the Civil War of the United States I was one of the surgeons to a military hospital located in the city of New York to which were sent large numbers of soldiers requiring artificial limbs. These cases were individually studied with great care, and full records were made of all of the useful facts connected with them. Many of the deductions then made from these facts do not now have the force which they then had, owing to the influence of antiseptic methods on the results of the treatment of amputation wounds. There were some features, however, of the investigations then made of a more permanent value, and which may prove instructive to the members of this section. It is in that view that they are brought forward in this paper.

1. INFLUENCE OF THE PLACE OF AMPUTATION UPON THE AMOUNT OF ATROPHY OF THE STUMP.

Among the final results of amputations, atrophy of the stump must be regarded as of the first consideration. Next in value to a firm and durable covering to the stump is a well-nourished extremity. If the stump undergo progressive atrophy, the artificial limb requires much more care to maintain its adaptation. The constant shrinkage of the extremity renders the appliance loose, and hence it requires readjustment by continuous padding of the socket. This padding of the socket is not required when the limb maintains its full dimensions.

The accompanying tables enable us to determine how far the method of operating, and the point of the limb at which the amputation is performed, influence the subsequent nourishment of the stump. The measurements were made when the stump was healed and prepared for the final adjustment of the artificial limb. The first or proximal measurement was made in the thigh, at the highest point where the circumference could be taken, and in the leg immediately below the knee. The second, or distal measurement, was made directly around the extremity of the stump, at a point where the margins of the flap begin to incline toward the cicatrix. The figures entered in the tables under the head "Atrophy" express the difference in inches and fractions of an inch between the measurement at the points above indicated of the mutilated and uninjured limb.

Comparative amount of atrophy of stumps in the upper, middle, and lower thirds of the thigh and leg, in an aggregate of 430 cases.

[In inches and fractions of inches.]

Limb.	Upper third.		Middle third.		Lower third.	
	Proximal.	Distal.	Proximal.	Distal.	Proximal.	Distal.
Thigh	0.45	1.05	1.56	1.70	1.34	2.08
Leg	0.97	1.70	0.71	1.42	0.57	2.26

It must be borne in mind that the proximal measurements in the thigh are all made at the same point; and the same is true of the leg. It would appear from this table that the point of amputation exercises a very marked influence upon the degree of atrophy of the stump, both in the thigh and leg. In general, the amount of atrophy progressively increases as we recede from the trunk, an exception, however, being noticed in the middle third of both the leg and thigh, which we shall presently notice. In the thigh the proximal atrophy is least in amputation in the upper third, and greatest in amputations in the middle third. In amputations in the lower third of the thigh the proximal atrophy is slightly less than in those performed in the middle third, but still it is three times as great as after those in the upper third. This fact proves a progressive proximal atrophy as the point of amputations in the thigh recedes from the trunk. In the leg this rule is reversed, and the proximal atrophy diminishes as the point of amputation recedes. And this atrophy diminishes in regular order, being least in amputations in the lower third of the leg.

It must not be supposed that the proximal atrophy is influenced by the amount of inflammatory thickening subsequent to the operation, for in that case the degree of atrophy would in general depend upon the proximity of the amputation to the point of measurement. But this is by no means the case. Amputations in the middle third of the thigh, near the point of measurement, are followed by a greater amount of atrophy than those in the lower third, remote from that point; while in the leg the largest amount of atrophy is in amputations near, and the least in amputations remote from the point of measurement.

The distal atrophy, or that which occurs at the extremity of the stump, has in the thigh a progressive increase as we proceed from the trunk, being about twice as great, in the lower as in upper third. In the leg, on the contrary, the least distal atrophy occurs in the middle third, while that of the lower extremity is not so great, compared with that of the upper extremity, as was found existing between the upper and lower thirds of the thigh.

Comparing the atrophy of the stumps in thigh and leg amputations, we notice that the proximal atrophy is greater in amputations in the upper third of the leg than in the same region of the thigh, while in the middle third it is more than twice as great in the thigh as in the leg, and in the lower third the excess of atrophy is greater in the thigh in proportion than in the leg. The distal atrophy varies very markedly as follows, namely: In the upper third it is greater in the leg; in the middle third it is greater in the thigh; and in the lower third it is greater again in the leg.

These facts may be stated in general terms as follows: (1) In the thigh, the farther amputation is performed from the trunk the greater will be the atrophy of the entire stump. (2) In the leg, the farther amputation is performed from the trunk the greater will be the atrophy of the extremity of the stump and the less the atrophy of the body of the stump.

2. INFLUENCE OF THE METHOD OF AMPUTATION UPON THE ATROPHY OF THE STUMP.

We next proceed to inquire as to the influence of different methods of amputation upon the nourishment of the stump. The following table contains a distribution of the several methods of amputation in the thigh and leg, with a computation of the average amount of atrophy following each:

Comparative amount of atrophy of stumps after amputation by various methods in the upper, middle, and lower thirds of the thigh and leg.

[In inches and fractions of an inch.]

THIGH.

[Total number of stumps, 157.]

Method.	Upper third.		Middle third.		Lower third.	
	Proximal.	Distal.	Proximal.	Distal.	Proximal.	Distal.
Circular	0.7	0.7	1.4	1.9	1.6	2.5
Antero-posterior flaps	0.2	1.4	1.1	1.6	1.6	2.4
Lateral flaps			1.8	1.8	1.6	2.3
Anterior flap			2.5	2.2	1.3	2.4
Rectangular flap			1.0	0.0	2.0	2.8
Skin flaps and circular muscles					0.6	1.5
Posterior flap					0.7	0.7

LEG.

[Total number of stumps, 287.]

Circular	1.1	1.5	1.0	2.3	0.5	2.3
Antero-posterior flaps	1.1	1.3	0.4	1.1	0.1	2.7
Posterior flap	1.3	1.1	0.5	2.2	1.0	2.6
Lateral flaps	0.4	2.9	1.0	1.0	0.7	2.6
Skin flaps and circular					0.5	1.1

This table illustrates in a very striking manner the influence of the various methods of forming the covering of the stump upon the nourishment of its cicatrical tissue. The difference in the amount of atrophy of the distal extremity evidently depends upon the extent to which the arterial supply has been sacrificed. In the thigh the arteries which are distributed to the muscles are principally, in the upper third, from the femoral branches immediately below Poupart's ligament, and in the middle and lower third from the profunda.

In the upper third of the thigh, therefore, a circular amputation would divide the branches of the femoral at a higher point than an antero-posterior flap, in which the posterior flap is usually longer than the anterior, and hence the atrophy would be greater in a stump formed by a circular than in one formed by an antero-posterior flap. The same rule would apply to these operations in other parts of the thigh, though perhaps not so markedly.

The method of operation by lateral flaps does not differ materially, in respect to the degree of atrophy, from the circular, and the results of the two are seen to be very similar.

The method of operation by making an anterior and rectangular flap differs in this important respect from the preceding methods, namely, that the flap is made wholly from the anterior part of the limb, while the tissues are completely divided to the bone in a perpendicular direction on the posterior aspect of the limb. By these methods the principal covering of the stump is poorly supplied with nourishment, and hence atrophy would be more likely to occur. This is seen to be the case especially in the anterior-flap method in the middle third and the rectangular flap in the lower third.

The methods which give the least atrophy of the stump, both in its proximal and

distal portions, are the skin flaps and circular of the muscles and the posterior flap. It is not difficult to understand why the posterior-flap method gives results so favorable; it leaves quite intact the full vascular supply to the entire covering of the stump. In this respect it might well be regarded as the best method of operation in the thigh, but these advantages are so counterbalanced by the tendency of the flap to retain pus, its heavy and unsuitable position for transportation, etc., that it has but few advocates. The method by skin flaps and circular of the muscles gives results nearly as favorable as the posterior flap, and much more favorable than any other of the preceding methods. It is greatly preferable to the posterior-flap method, both on account of the facility of drainage and the neat apposition and lightness of the flaps, thus adapting it to transportation.

The influence of the various methods of operation upon the nourishment of the stump is not so well marked in the leg as in the thigh. This is unquestionably due to the peculiarity of the arterial distribution. The larger trunks are numerous, and are deeply situated in immediate relation with the bones. They are not, therefore, liable to division until the operation is about to be completed. There would, therefore, be but little difference among these operations as regards the vascular supply of the flaps, except so far as the extent of the flap should modify the ultimate distribution of arteries. A long flap would necessarily have less supply than a short flap, and would be more liable to immediate death and future atrophy. Of the different methods it will be noticed that the skin flaps and circular of the muscles gives the least atrophy in the leg as well as in the thigh.

3.-COMPARATIVE VALUE OF STUMPS IN AMPUTATIONS IN THE LOWER THIRD OF THE LEG AND AT THE ANKLE JOINT.

It must be observed that amputation at the ankle joint is always an alternative operation. It is selected in preference to an amputation at a point higher up in the limb. It should also be added that it is an operation of expediency. It is not a dernier resort. If it fails of success the surgeon may still, with rare exceptions, perform the alternative amputation through the leg with the prospect of as favorable results as when the latter is the first operation.

In determining the value of ankle-joint amputations, therefore, the following questions naturally arise for our consideration: The comparative serviceableness of the resulting stump depends upon (*a*) the ability for unaided locomotion on the stump; (*b*) the adaptation of the stump for an artificial limb.

(*a*) *As regards unaided locomotion on the stump*—Ankle-joint amputations differ from amputations in the leg in this essential particular, namely, in the former the support is taken directly upon the extremity of the stump, and in the latter upon the sides of the limb. In model stumps of each class it will be found that the one which takes direct support upon the extremity is not only capable of enduring a much larger degree of service, but the person suffers far less inconvenience. Direct pressure upon the heel flap may be endured as long in Syme's stump as similar pressure upon the natural heel. And the same is true of stumps following Pirogoff's method. Patients with these stumps have frequently been known to walk successive days 20 and 30 miles with only the simple covering or protection of the heel of a common shoe or boot, and these are by no means exceptional cases. Surgeons who have been accustomed to meet with the results of this operation most frequently uniformly testify to the ease with which patients betake themselves to the stump with only such covering as they can rudely adjust. Of the stumps left by Syme's and Pirogoff's operation, the latter has the greater length, and this requires less compensation.

Amputations through the leg, at whatever point, and however skillfully performed, never furnish stumps which take direct support.* The limb is useless for

*Truax, an experienced manufacturer of artificial limbs, makes this statement: "When a section has been made through a bone no weight can be borne on the end of the stump. Disarticulation, or an osteo-plastic operation, alone will admit of pressure."—*Amputations in the light of prothetical science.*

locomotion by any simple means of compensation; it is only when an artificial limb is accurately and skillfully adjusted that it serves the purpose of even simple progression.

Again, in amputation at the ankle joint, the patient retains power over the muscles of the calf which are essential to the act of running. It is extremely rare that a patient who has suffered amputation of the leg can make even the pretense of running upon his artificial limb. The muscles, especially of the calf, have shrunken from disuse, and progressive, permanent atrophy of the parts below the knee ensues. In ankle-joint amputations, however, the tendons of all the muscles employed in locomotion retain their former, or acquire new, attachments, and are immediately and constantly exercised in the movements of the limb. It is true this movement of the muscles is more limited than in the normal limb, but it is nevertheless sufficiently great to preserve much of their activity, and consequently their nutrition is but partially impaired. The importance of preserving the functions of the muscles of the leg is seen in the perfection of gait which persons with ankle-joint amputations soon acquire. They can not only run, often with great ease and facility, but they acquire the power of leaping, dancing, etc., to such perfection that their disability frequently passes unrecognized.

(b) As regards the adaptation of the stump for an artificial limb.—As previously stated, the stump after ankle-joint amputation takes direct support upon the extremity. Mr. Quain thus speaks of the advantages of direct support, in referring to Syme's amputation:

> It is free from any valid objection, and, what is more important, the result in practice has been found to be good. A person who has undergone this operation is enabled to bear his whole weight upon the end of the stump without inconvenience; and on this account the facility of progression is, with a proper apparatus, decidedly greater than when the amputation is performed at any higher part of the limb.

The advantages of the ankle-joint stump over those of the leg for the adaptation of an artificial limb are admitted by the most competent mechanical surgeons to be of the most undoubted character. In Syme's amputation the patient walks upon the end of the stump with ease and grace, can run, leap, and dance, and is capable of enduring fatigue little short of that of the sound limb. Dr. E. D. Hudson, of New York, a most skillful mechanical surgeon, and who was selected by the Government to apply artificial limbs to the soldiers in the hospital referred to, states that in fifty cases of ankle-joint stumps to which he applied limbs he had not met with a single instance where the stump did not after preparatory treatment take direct pressure without inconvenience and give a most happy result. No results at all comparable with this are attainable with any form of stump immediately above the ankle.

This review of the comparative merits of ankle-joint and leg amputation as exhibited by statistical evidence authorizes the following conclusions: (1) The stumps left after ankle-joint amputations are far more serviceable than those resulting from leg amputation for unassisted locomotion; (2) an artificial limb can be far more usefully applied to an ankle joint than to a leg stump.

Upon suggestion of the president of the section, the discussion of Dr. Stephen Smith's paper was deferred until the following paper had been read:

AMPUTATIONS PROTHETICALLY CONSIDERED.

By GEORGE E. MARKS, A. M.

Intercourse with a considerable number of surgeons, those who reside in the centers of prothetical industry as well as those who inhabit more remote parts, discloses a lamentable absence of knowledge on the subject of "amputations" when viewed in the light of prothesis.

In consequence of a want of familiarity with this aspect of the subject, we artificial-limb makers have frequently brought to our presence stumps that are good, bad, and indifferent; stumps that could have been better; stumps that reflect credit, discredit, and no credit on the surgeons who performed the amputations, or on those who attended to them after the amputations were performed; stumps that can readily be inserted into artificial limbs with the assurance that no trouble will follow and that the possessors will live in the sublime consolation of having realized the removal of their disabilities for all practical purposes; stumps that might have been better and would have been beyond criticism had the operators taken advantage of opportunities which familiarity with prothetical methods would have revealed to them.

The time has arrived when this subject should receive more thought and when prothetical knowledge should be more widely disseminated.

I can see in the not very distant future the subject of prothesis embraced in the curricula of the schools and colleges of surgery, when a graduate will be equipped with all the information requisite to guide him to not only amputate properly, but to put the stump in the most favorable condition for the prothetician; to take measurements, diagrams, and casts when necessary; to enable his patient to obtain a suitable appendage with the least delay; when his knowledge will enable him to detect defects in adjustment and to remove them; to prescribe changes that may be required in an artificial limb to accommodate changes that may take place in a stump. As surgeons will always be more numerous than leg-makers, it is all the more important that their information on this subject should be broad and thorough.

I shall discuss the subject of "amputations, prothetically considered" from but a few standpoints, confining myself to amputations of the lower limbs only.

(1) LENGTH OF STUMPS.

Any stump that is well covered with integumentary tissue can not be too long. I am well aware that when I advance this proposition that I antagonize the views of those artificial-limb makers who have not kept abreast of the times and am controverting the rules that have been laid down by some writers of repute on the subject.

Artificial limb-makers, not many years ago, almost to a unit decried the amputation of a leg below the junction of the lower and middle third, or "the point of election," so called, and were pronounced in their utterances against all ankle and partial foot amputations.

The methods which were then employed produced artificial legs that were not capable of adaptation to long stumps, particularly to stumps that extended to the ankles or below the tarsus. I may add that this adverse opinion on long stumps is still held by some protheticians, notwithstanding the fact that great departures have been made during the past decade or two in prothetical methods. When a leg maker of modern times says that an amputation should not be made below the point of election, you may regard him as confessing that he has not the ability to make a leg that can be worn on a long stump.

To-day artificial legs are made that can be worn on stumps of any length, tibio-tarsal, medio-tarsal, and tarso-metatarsal not excepted. Any stump that is capable of bearing weight on the extremity is preferable to one that can not. A tibio-tarsal amputation, made after the method of Dr. Syme, produces an end-bearing stump, and can be placed in the category of "the most favorable." An amputation after Dr. Pirogoff's method is also productive of an end-bearing stump, provided the os-calcis is properly placed and united to the tibia or securely held in the inter-malleolar space. An amputation in the tarsus, or at the tarso-metatarsal junction, after any of the methods of Chopart, Lisfranc, Hancock, or Hey, is productive of a stump that is capable of being treated prothetically.

In every partial foot amputation care should be exercised to prevent the contraction of the tendo-achilles. Usually lashing in a suitable contrived splint will suffice. If this means will not accomplish the object, either tenotomy or fixation of the ankle joint should be resorted to, for if the heel is allowed to draw up and the amputated surface point downward, the possessor of that stump will be obliged to have an artificial leg applied that will not touch, but that will shield the amputated surface. This means that the artificial leg will elongate that side and necessitate the wearing of a thick sole and heel on the shoe worn on the well or companion foot. Such a stump ceases to be an end-bearing stump, and its disadvantages are apparent.

I have a horror for those modifications of Chopart's and Pirogoff's operations that do not provide flaps on which the weight of the subjects can be endured. A case was brought to my attention some years ago which I can opportunely refer to here. A young man, farmer by occupation, residing in Vermont, had his foot crushed. Amputation was deemed necessary. A modification of Chopart's operation was performed. The stump that resulted presented the appearance of an inverted cone, the apex scantily covered with tissue and extremely sensitive. This stump was hopelessly an end-bearing stump, and had to be treated the same as if amputation had been made above the ankle. It is obvious that inasmuch as a Chopart's operation could not have been performed, a Pirogoff's or a Syme's or even an amputation above the ankle would have given the patient a much better stump. This illustrates the importance of amputating for an end-bearing stump in a way to save the continuity of bone and to obtain an ample flap, even if the tarsus has to be sacrificed.

The advantages of a totally or partially amputated foot, producing an end-bearing stump, over a leg amputation are many. The more important are the following:

(1) An artificial leg for an ankle or partial foot amputation costs only one-half the standard price of an artificial leg for an amputation above the ankle.

(2) An artificial leg for any of the above end-bearing stumps does not incase as much of the leg and thigh as an artificial leg for an amputation above the ankle.

(3) The possessor of a stump extending to the ankle can improvise a sheath with suitable pad on which he can rest his stump and walk tolerably well; or if his stump extends to the metatarsus and he has a portion of the plantar surface of the foot left, he can walk and get about quite well without any contrivance. These are vital considerations for the poor man, and should be regarded by the surgeon.

The most modern and approved artificial legs for ankle and partial foot amputations provide phalangeal support, which will readily be conceded, is absolutely necessary to aid progression and prevent limping. The absence of phalangeal support is always felt by those who do without prothetical assistance.

During the past two years I have personally superintended the construction and application of over 300 legs to stumps that have followed tibio-tarsal, medio-tarsal, and tarso-metatarsal amputations. During the existence of the house of which I am a member (A. A. Marks), over 14,000 subjects, with amputations at various points of the leg, thigh, and arm, have been supplied with artificial limbs, Most of them have come under my personal supervision. With this experience, I feel myself competent to say that long stumps with ample flaps, that stumps resulting from tibio-tarsal, medio-tarsal, and tarso-metatarsal amputations can be supplied with artificial legs that will be comfortable and pleasant to wear and that will restore the wearers to the amplitude of their usefulness.

A stump extending below the knee is preferable to a stump extending to the knee, provided the stump is capable of flexion and extension. If the stump is disposed to become extended and anchylosed it will be preferable to sacrifice the leg to the knee.

I had occasion to share the regrets of a subject that was brought to my office not many years ago. This man's leg had been amputated about 4 inches below the knee articulation; the stump was extended and anchylosed. To make an artificial leg for him would necessitate a rigid knee in the artificial, or an articulating knee

out of parallelism by about 4 inches with the natural knee. Either would place the fellow at a disadvantage, especially when sitting. If in the amputation of this leg the operator had had any indication that his patient's stump would have become extended and anchylosed, he would have displayed greater wisdom if he had amputated through the knee articulation. Any amputation below the knee should, so far as possible, be made with proper regard to the preservation of full knee mobility, and during the recuperative period the knee should occasionally be forced into action so as to prevent impairment of the flexors and extensors.

A stump extending to the knee is preferable to a shorter stump. The condyles and nodules of the femur should never be excised in knee disarticulations. The nodules afford means for securing an artificial leg and the condyles and articular surfaces are better prepared by nature to endure pressure than the saw or the knife can prepare them.

If the patella can be placed in the inter-condyloid space and properly secured it is always desirable to do so.

The foregoing, I hope, will serve as an appeal to every operating surgeon to sacrifice as little of the human limb as possible, giving a proper regard to the securing of integumentary tissue for the purpose of covering the extremity and protecting the partly excised bones. These are certainly the teachings of the wisest and most conservative surgeons of the past, and I know of no reason why they should now be relegated to obsolescence.

(2) FLAPS.

All stumps should be provided with ample flaps, not redundant flaps. A redundance of tissue on the extremity of a stump is no advantage. The prime office of a flap is to protect the extremity of the bones, and they should be only ample to effectually perform that function. Whether the flaps are anterior or posterior, external or internal, or a combination of any of the four, it matters not, so long as the extremities are well protected. Periosteal flaps are desirable, as they give additional protection to the bones and prevent integumentary flaps from becoming adherent to the bones.

If an amputation is to be made below the middle third of the leg, bone should be sacrificed in order to obtain suitable flap. If the amputation is to be made above the middle third, bone should not be sacrificed, even if transplantation is necessary in order to secure flap. Every inch of healthy bone above the middle third is desirable for leverage purposes. If a thigh amputation is to be made close to the knee, bone can be sacrificed in order to secure flap. The nearer the amputation is to be made to the body, the greater should be the care to save bone.

(3) THE DISPOSITION OF CICATRICES.

The rules established by all the accepted authorities on ankle and partial foot amputations should be rigorously observed. By so doing the disposition of the cicatrices will be the most advantageous for prothetical purposes.

In all amputations of the leg and thigh, as well as knee disarticulations, the cicatrices should, as far as possible, be placed well away from the extremities of the bones, and preferably along the posterior aspects. Contiguity or adhesion of the cicatrix with the extremity of a bone is frequently the cause of suffering.

(4) TREATMENT OF STUMPS AFTER THEY HAVE BECOME HEALED.

A stump, before it is called upon to perform the functions of operating an artificial limb, is an inactive remnant of an active member of the body. On account of its inactivity it becomes disposed to accumulate adipose tissue, and if permitted to do so it will become abnormally large and edematous. If possible, this growth or condition should not be permitted. Usually, tight bandages will prevent it. The bandages should be applied from the time the stump has healed until the artificial leg

is applied. The bandages should be as tightly drawn as possible and not interfere with circulation. The bandages should be applied in the usual way, beginning at the extremity of the stump, and continued the entire length of the complete section of the limb above the stump. This means, for a partial foot amputation, that the bandage should be carried to the knee, and for a leg amputation, that the bandage should be carried to the body.

I have frequently met surgeons who incline to the belief that an attenuated stump should be allowed, and in fact encouraged, to grow so as to possess the dimensions of the companion leg before an artificial limb is applied. This certainly would be desirable if such growth would permanently and effectually resist the influence that an artificial leg will exert on the stump to reduce it.

It can be stated for a certainty that an artificial leg will harden, solidify, and diminish any stump. In consequence of this, it is desirable to keep the stump as small as possible, so as to minimize the changes that will follow the application and wearing of a leg.

(5) TIME TO APPLY AN ARTIFICIAL LEG.

It will be safe to apply an artificial leg to a stump that has resulted from traumatic causes as soon after the healing of the stump and the recovery of the patient to his normal vigor as possible. Nothing can be gained by waiting beyond that time. Waiting entails a loss of time and permits the stump to become enervated from disuse.

A stump that is the result of disease, especially if of a malignant nature, should be obliged to wait until there is a certainty that the pressure, confinement, and concussion that follows, more especially the initial operations on an artificial leg, will not excite a recurrence of the disease.

A child who has lost a leg is never too young to have an artificial leg applied. It should be observed that the tissues, bones, and articulations of an infant or a growing child must be forced into action in order to become developed, healthy, and vigorous.

To hobble about on one or a pair of crutches for a number of years is rather a severe and inhumane punishment to impose on a child because he is growing. An artificial leg of modern construction can be lengthened from time to time at a very slight expense, and as an artificial leg provides the nearest approach to a natural prop for the amputated side, it is the only means that will encourage healthful growth and symmetrical development.

To illustrate this fact, I can do no better than present the case of an infant, brought to me by Dr. Bacon, of New Haven, Conn. The child was not quite nine months old when I took her in charge. Her leg had been amputated 2 inches below the knee for congenital causes. The stump tended to flex and remain so and anchylosis was feared. I applied a neat-fitting leg with knee articulation. The artificial leg held the stump in extended and flexed positions, according to the manner in which the child was held or placed. In a few months the child began to creep, a few months later she was able to stand, and later still she learned to walk. The artificial leg assisted her in all these operations of progression. She developed rapidly and symmetrically and to-day she is a young lady of comely proportions, enjoying good health, walking as gracefully as one in possession of nature's limbs, a testimony of the wisdom of applying artificial limbs to the young when misfortune has deprived them of their share of extremities.

REMARKS OF PROF. CHARLES B. PARKER, M. D., OF CLEVELAND, OHIO.

Mr. PRESIDENT AND GENTLEMEN OF THE SECTION: It seems to me that this subject we have before us is one that is well worthy of our attention. In our profession, as in others, there are certain fashions and fads. At the present time the subject of abdominal surgery is occupying very largely the surgical mind. Abdominal surgery

is a subject which should be practiced only by a few, because the highest success is only acquired by great experience, and in operating one or two men should do the work. Mr. Marks has said that he finds the results of amputation good, bad, and indifferent. Now, there are a great many elements which go to make up a satisfactory amputation. Antiseptic methods are widely practiced and the surgeon is inexcusably ignorant if the healing is not prompt and perfect. But there are many considerations beyond the mere healing of wounds. It is necessary to do something more than simply remove the mutilated or injured extremity, such as the best position, the best point at which the amputation should be made, where shall the scar be, etc., and, in my judgment, to successfully carry out an amputation, to restore a man or individual to usefulness so that he can be a help to himself and others, is one of the greatest triumphs in life.

The subject of the first paper by Dr. Smith is somewhat different from what I had been led to expect, and as I had no synopsis I was rather surprised at the scope of the paper. I had supposed that he would confine himself to the place of selection. I was also surprised somewhat by the statement made by the second speaker in regard to amputations of the foot. I feel that this whole subject of amputation of the foot must be gone over once more. With reference to the length of the stump, I certainly am willing to listen to the advice of Mr. Marks, whose experience has been greater than mine. Most of us have been accustomed to look upon the point of selection as in many respects best. If you have to deal with a laboring man who has to use a stump, the amputation should be most carefully considered. I also believe that a splint is a useful thing in the first and early dressing of stumps and amputations. I usually place a straight back splint upon amputations of the leg. It prevents the tremor of the muscles and gives a good support to the dressings, and is a help in moving the patient about in the bed. I make this a rule in all amputations of the lower extremities. In amputations of the leg I prefer a lateral flap, which brings the cicatrix well to the outer side, and prevents the hamstring muscles from retracting so much.

I am very glad that this subject has been brought up, because I feel that some discussion in this line of work, and especially in regard to amputations upon the lower extremity, would be not only interesting but profitable. There is much to be said, and some of the methods that have been practiced and which are accepted as time-honored, I think, ought to be abandoned.

Col. Tomas Casas, medical subinspector of the first class of the Spanish army in Cuba, official delegate to the Pan-American Medical Congress and honorary president of this section, having been called to the chair by the executive president, addressed the section in Spanish.

Col. Casas expressed great pleasure in having been given the opportunity to meet so many distinguished medical officers of the U. S. Army, and of other services, and to have been permitted to take part with them in their deliberations. He congratulated the United States upon having so excellent a military sanitary organization as the Hospital Corps, as evidenced by the object lesson in field work given that afternoon, and expressed the hope that through the interchange of experiences by military medical officers at this and future meetings of the Pan-American Medical Congress much would be accomplished looking to the amelioration of the horrors of war.

Passed Assistant Surgeon D. M. Guiteras, U. S. Navy, Spanish-speaking secretary of the section, then presented the following named papers, written in Spanish, by medical officers of the Spanish army, which papers were read by title.

"Aprestos de Campamento de Uso en Cuba por los Medicos Militares." (Field Appliances in Use in Cuba by Military Surgeons.) By Dr. Felix Estrada Catoyra, Captain-Surgeon Spanish Army, Havana.

In this paper the author discusses the difficulties experienced in using the modern field appliances and ambulance service in countries almost entirely without roads,

and gives a description of everything taken to the field by the hospital corps, appliances ready for use, and material with which to make them when it becomes necessary to replace them. He also describes their hospital tents and furniture, and the huts they have to build, with thick covering of dried palm leaves at times when the heat makes use of tents impossible.

APRESTOS DE CAMPAMENTO DE USO EN CUBA POR LOS MÉDICOS MILITARES.

By Dr. Felix Estrada Catoyra, Habana (Cuba), *Medico 1º del 10º. Batallon de Artillería.*

La especial invitación dirigida por el ilustre presidente de la Sección de Sanidad Militar en el Congreso médico Pan-Americano, para disertar sobre el tema que sirve de epígrafe, me obliga, ya que personalmente no puedo concurrir á ésta gran manifestación que las ciencias médicas dedican al centenario de Cristobal Colon, á dirigiros éste escrito, sintiendo que la escasez de tiempo para preparar un estudio completo sobre el asunto, y la deficiencia de mis conocimientos, no me permitan llevar á cabo un trabajo digno de las eminencias científicas congregadas en el Capitolio de la gran República Norte-Americana.

Espero confiadamente, que teniendo en cuenta la buena voluntad que me guia, dispensareis vuestra benevolencia á ésta modesta disertación.

La historia militar nos revela, que desde los primitivos tiempos, fueron los ejércitos acompañados de cirujanos, encargados de la curación de los heridos, y de la asistencia de los enfermos; siendo objeto de varias esquisitas investigaciones la forma y manera en que se practicaban los servicios sanitarios entre los Egipcios, Griegos y Romanos. Sabemos así, que los ejércitos de Maratón, Platea, Nicopolis y Arbela, así como las falanges de Agesilao y Lisandro llevaban personal sanitario; que los Persas en sus guerras contra los Asírios también tenían médicos; que los Romanos establecían el *valetudinarium*, y llamaban *impedimenta* (estorbo) al convoy de enfermos y heridos que con los víveres y aprestos marchaban tras de los ejércitos.

Según consigna Colombier, en los pasados siglos iban los heridos y enfermos en montones sobre los carros; por lecho solo tenían una poca paja; una ligera manta les preservaba del frío, sufriendos los ardientes rayos solares, sin mas socorros que alguna tisana. Por otra parte, era tan escaso el respeto que por las masas combatientes se guardaba á los heridos, que encontraríamos horrible la descripción de las matanzas y atropellos de que fueron objeto los que caían en poder del enemigo.

Hoy sucede lo contrario: el general en gefe de todo ejército, se preocupa tanto de sus soldados enfermos y heridos como de los que tiene en disponibilidad para el ataque ó la defensa. Además, el convenio de Ginebra, de 22 de agosto de 1864 ha establecido leyes humanitarias que obligan á todas las naciones beligerantes á la asistencia de los lesionados, á respetar la neutralidad de los heridos y de los prisioneros.

Siempre la aglomeración de enfermos y heridos ha producido funestos resultados como puede comprobarse por la historia de las guerras, guardandose memorable recuerdo de algunas campañas, como, por ejemplo, las de Napoleon. Por el contrario, el sistema de dispersión adoptado posteriormente ha dado brillante éxito, como lo demuestran los resultados de éste sistema seguido en las guerras modernas. Desde que el filántropo Larrey inventó aquellas ambulancias *volantes* que vemos aparecer en el ejército del Rhin, el socorro á los heridos se ha hecho cada vez mas rápido; y como dice un ilustrado escritor, "Desde entonces los cirujanos militares unen á la serenidad del hombre de ciencia, el valor y la audacia del hombre de guerra. Seguros de que serán socorridos inmediatamente, nuestros soldados se sienten poseidos de mayor ardor bélico, y puede afirmarse, que la victoria, mas de una vez, ha sido debida á la notable invención de Larrey."

Ardua empresa sería hacer una narración histórica de los diferentes sistemas empleados en las numerosas campañas para atender á la cura y transporte de los heri-

dos; pero indudablemente que un trabajo de ésta índole, nos haria ver las sucesivas invenciones que el espíritu generoso de la sanidad militar fué poniendo en práctica, para mejorar la suerte de los heridos y combatientes lesionados en la guerra; así como las mejoras y perfeccionamiento por que fué pasando el material sanitario de campaña, desde los mas remotos tiempos hasta nuestros días, debido á la enseñanza que proporcionaron las diferentes guerras.

Los estudios que se han hecho de las campañas modernas á poco de terminarse, han prestado importantísimo servicio; todos los detalles han sido aprovechados por los hombres de combate en las sucesivas contiendas; ya influyendo en la estrategia, en los movimientos tácticos, en el armamento y municiones; en una palabra, en la manera de hacer la guerra. Pero mas interesantes han sido para la humanidad estos estudios, por las modificaciones imprimidas en los servicios sanitarios. La esperiencia adquirida en los campos de batalla por los médicos militares ha favorecido la recojida de los heridos, perfeccionado el transporte, estableciendo los sistemas de ambulancias, facilitado la evacuación del campo con nuevos aparatos; influyendo todo esto en las operaciones quirúrgicas, salvándose mayor número de heridos, evitando muchas complicaciones en los fracturados; perfeccionándose notablemente el servicio sanitario castrense, estando mas garantizada la vida de los combatientes; presentando el médico con sus inventos quirúrgicos y esmerados cuidados, un saludable contraste que sirve de valladar á esos mas rápidos y precisos sistemas de matar que constituyen el progreso de la guerra moderna.

Los adelantos de la cirugía militar no se han limitado al tratamiento y curación de las heridas y fracturas; á la aplicación de vendajes, al uso de camas especiales para los operados, etc., sino que ha dado lugar á los ingeniosos medios para el transporte de los heridos por fuerza animal y por máquinas, á la disposicion de los convoyes por agua y por tierra, empleando gran velocidad en atender á las necesidades facultativas que han nacido de la guerra. Cada campaña de los tiempos modernos ha traido un nuevo progreso á ésta parte de la cirugía.

No hemos sido los médicos españoles los mas estraños á estos estudios y á su adelantamiento, pues nuestras campañas han dado á la ciencia el resultado de la practica de nuestros cirujanos, cuyos escritos sobre el tratamiento quirúrgico de las heridas les ha proporcionado renombre universal en la história; *"fundandose la gloria de la medicina militar española en las operaciones que evita y no en las que hace."* * Nuestra cirugía clásica de los siglos quince y diez y seis ha sido observada en nuestras guerras modernas de este siglo, lo mismo en la que llamamos de la independencia contra los ejércitos de Napoleon, que en la civil de los siete años, † así en la campaña de Africa, ‡ como en la de Santo Domingo, en la carlista reciente, en la separatista de Cuba, § en las luchas sostenidas en las posesiones de Asia contra los joloanos y demos pueblos indígenos, lo mismo que en las escaramuzas revolucionarias y ataques de las barricadas, tan frecuentes por disgracia en nuestra pátria durante algunos años.

Pero si hemos sabido conservar las tradiciones de la cirugía militar española por lo que hace á la cura y tratamiento de las heridas y fracturas, y somos en general los

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* Véanse las siguientes obras publicadas entre nosotros:

Memoria sobre el orígen y vicisitudes de la terapéutica que han seguido los cirujanos españoles en las heridas de armas de fuego. Por D. Marcelino Gomez Pamo.

Tratamiento de las heridas de armas de fuego segun la práctica de los médicos militares españoles, seguido de ligeras nociones de higiene militar de campaña. Por D. Ramon Hernandez Poggio.

Terapéutica de los cirujanos españoles en las heridas de armas de fuego. Por D. Antonio Población y Fernandez.

Historia de la medicina militar española, del último autor.

† Véase: Reseña histórica de las principales operaciones quirúrgicas practicadas en los hospitales de campaña durante los siete años de la guerra civil.—1852.

‡ Véanse: História médica de la guerra de Africa. Por D. Antonio Población y Fernandez.

La campaña de Marruecos. Memorias de un médico militar. Por D. Nicasio Landa.

§ Remembranzas médicas de la guerra separatista de Cuba. Por D. Ramón Hernandez Poggio.

médicos españoles partidarios de la *cirugía conservadora;* no se han dejado de estudiar y perfeccionar los medios de trasporte, aumentando nuestros aprestos de campamento.

A pesar de las vicisitudes económicas por que ha pasado nuestra nación, en nuestras campañas no tenemos que lamentar desastres tan terribles como los sufridos por los Francess en Crimea.* Tampoco hemos tenido que sentir las deficiencias que caracterizaron la campaña de los Turcos en la Herzegovina, donde gracias á la asistencia de los cirujanos ingleses, y á las asociaciones particulares mejoraron las tristes condiciones de los heridos y enfermos.

En nuestra guerra de Africa nada faltó respecto á provisiones, tiendas, equipos y trasportes; en la espedición que hizo nuestro ejército á Méjico, el servicio y material sanitario fué tan completo que de nada carecian nuestros convoyes de enfermos. La historia de la guerra carlista fué un ejemplo de las ventajas en la rápida evacuación de nuestros primeros hospitales, y del buen servicio de las ambulancias. La misma campaña de Santo Domingo, á pesar de las dificultades creadas por las circunstancias contrarias del clima, y del terreno, tuvo su éxito en los hospitales flotantes y en la evacuación de Montecristi y retirada final de nuestros heridos y enfermos.†

No creais que al hacer estos elogios de nuestro servicio sanitario, vaya á suponer es superior al de otras naciones. Muy léjos de mi ánimo y de la verdad científica sería esta aserción. Hasta osado parecería esponerlo ante este Congreso celebrado en el país que mas pruebas de adelantamiento científico ha dado en la cirugía militar. La guerra de secesion de estos Estados,‡ proporcionó á la ciencia interesantísimo progreso, pues como dice muy bien el Dr. J. B. Ullersperger, de Munich, § se distinguió la guerra americana principalmente por la liberalidad en todos sus gastos y provisiones frescas; por el esquisito cuidado de los soldados sanos ó heridos; por la rapidez de los socorros y trasportes, en vehículos sumamente cómodos, ya en caruajes, trenes, ó vapores; por la conveniencia de sus hospitales de madera espresamente erigidos; por el buen reparto de heridos y enfermos evitando siempre su escesiva acumulación; y teniendo muy en cuenta prudentes medidas para precaver los funestos cambios de clima y desarrollo de enfermedades, y por la seguridad de los viajes, ya de reclutas ó ya de licenciados.

Y no creais que significo esto como falaz adulación hácia vosotros, por galantería rendida á la hospitalidad. Todos los comentaristas de la guerra americana tributan grandes elogios á los cirujanos y médicos y al servicio sanitario de hospitales y ambulancias empleados lo mismo por una que por otra parte.‖

No menos fecunda y de trascendencia suma para el adelantamiento de los servicios sanitarios en campaña, fué la guerra franco-prusiana, lucha terrible entre dos pueblos que allá en Europa se disputan la supremacía en asuntos militares.

Pero no quiero embeberme en la importancia de las medidas sanitarias y servicios de las modernas campañas, pues esto me alejaría del tema objeto de mi discurso, al que voy á pasar resueltamente. Mas antes consignaré una proposición que aunque os parezca atrevida por sostenerla quien carece de autoridad científica, es positiva; y que si vosotros le dais vuestro asentimiento, adquirirá el valor de una verdad axiomática: "Los inventos modernos de ambulancias y aprestos sanitarios de campaña, apenas tienen aplicación en las guerras irregulares; y menos en paises que carecen de vias de comunicación, y cuyo terreno es accidentado no permitiendo utilizar los medios de trasporte y conducción de heridos y enfermos."

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* Véase: História quirúrgica del ejército francés en Crimea. Por Chenú.

† Cartas del Sr. D. Santiago Andrés Espala, publicadas por la Revista de Sanidad Militar de Madrid.

‡ Véase: Historia médico-quirúgica de la guerra de secesion de los Estados Unidos de la Union Americana, escrito bajo la direccion del médico general J. K. Barnes.

§ Noticias para la historia de la cirugía.

‖ Entre las muchas obras que pudieramos citar conviene hacerlo de la que "Sobre sanidad militar Norte-Americana," escribió el consejero ruso, Dr. H. v. Haurowitz. Stuttgart, 1866.

El ejército español posee en la Isla de Cuba un parque sanitario fundado en la Habana desde hace bastantes años, cuyo establecimiento si bien no construye material, pues lo recibe directamente del parque sanitario de Madrid, recompone algunos efectos de los que se destruyen con el uso, siendo su objeto principal la conservación y entrega á los cuerpos de cuantos aprestos constituyen el material sanitario ordenado por los reglamentos.

En dicho parque debe existir el material de ambulancias para el servicio y asistencia de los heridos y enfermos del ejército en operaciones de campaña, y para las atenciones del servicio en tiempos de paz. En sus almacenes estan clasificadas las existencias por grupos, figurando entre estos los siguientes que en parte detallarémos para que se pueda formar una idea de su importancia:

Primeras materias de construcción—cartón, cuero, hierro, hoja de lata, lienzo, lona, maderas varias, mimbre, etc.

Material de alojamiento—comprende dos grupos, el 1º de efectos para la construcción como argollas, columnas de madera, cuerdas, mazos, piquetes de hierro, mesas, tela preparada, travesaños, etc.; el 2º lo forma el material preparado como tiendas de campaña reglamentarias, cuadrilongas y cónicas.

Material de curación—medicamentos simples, como aceites, alcoholes, féculas, bálsamos vegetales, resinas, gomas, etc.; compuestos químicos, ácidos, sales, preparados amoniacales, ferruginosos, arsenicales, mercuriales, antimoniales, etc.; compuestos oficinales, estractos fluidos, tinturas, pomadas, ungüentos, glicerolados, soluciones, bálsamos, píldoras, cápsulas, etc.; todo segun el formulario de los hospitales militares.

Instrumentos de cirugía sueltos para repuesto, como compresores de arterias, cuchillos, bisturíes, pinzas, sacabalas, sondas, tigeras, sierras, etc., y agrupados formando bolsas de amputación, carteras para los practicantes, cajas de amputación, trépano, resecciones y otras varias.

Vendajes y apósitos, que comprende apósitos de fractura, arcos, férulas de alambre, férulas de madera, elásticas, tablillas, manoplas, bragueros, hilas, lienzo, vendajes de cabos, de cuerpo, vendas, algodon hidrofilo, makistoff y todo lo concerniente á las curas antisepticas.

Utensilios de farmacia—alcohómetros, básculas, balanzas, copas graduadas, embudos, espátulas, morteros, termómetros clínicos, píldoreros, etc.

Utensilios de ambulancia—cacerolas, cazos, cocinillas, cucharas, vasos, jofainas, piedras de afilar, etc.

Objetos de consumo—aceite de oliva, espíritu de vino, jabon común y fino, sal común, vinagre, etc.

Objetos de alumbrado—algodon de torcidas, mechas, bugías, faroles, linternas, yesca, etc.

Objetos de escritorio—cortaplumas, impresos, lápices, plumas, polvos de tinta, etc.

Envases de cristal—frascos de tapón esmerilado de diferentes tamaños, otros forrados de mimbre, etc.

Envases de hoja de lata—cajas para medicamentos, cantutos, de distintos tamaños, frascos para aceites y otras sustancias, con tapón de tuerca.

Envases de madera—alfileteros, cajas botiquines, barrilillos para líquidos, etc.

Envase de lona y cuero—bolsas de cuero para herramientas, fundas de lona para camas, saquillos, etc.

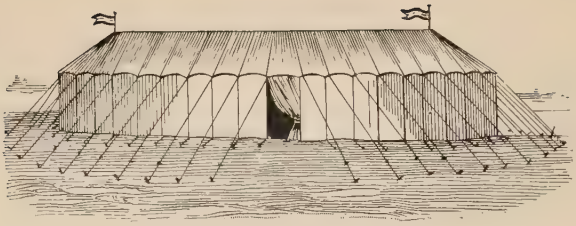
Envases de mimbre—cestones sencillos y dobles.

Ropas—blusas para oficiales, cabezales, delantales para enfermeros, jergones, mantas, paños, servilletas y tohallas.

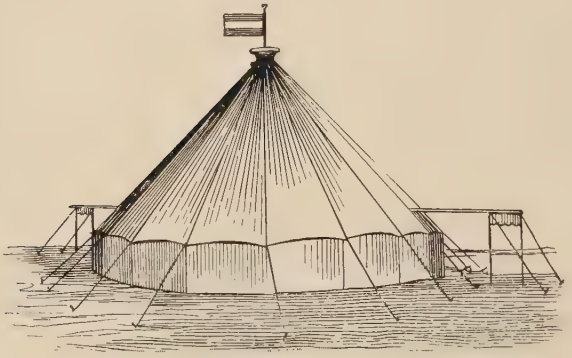
Muebles—mesas de operaciones, mesillas, etc.

Herramientas—agujas de embalar, atornilladores, clavos sentidos, hachas, limas, martillos, serruchos, tenazas, escoplos, palas, etc.

Objetos varios—atalajes, arreos de carga, banderas, banderines, cajas de farmacia, camillas, hamacas, furgones de dos ruedas.



Tienda de campaña cuadrilonga.



Tienda de campaña cónica.

Bolsa de ambulancia.

APRESTOS DE CAMPAMENTO. EJÉRCITO ESPAÑOL EN CUBA.

Material preparado—bolsas de ambulancia, botiquines de cirugía, botiquines de farmacia, cajas de repuesto de medicamentos, caros almacenes, cestones de repuesto de cirugía, cestones de utensilio de ambulancia, furgones de cirugía, maletines de ambulancia para caballería, modrilas de ambulancia para infantería.

Material de trasporte de heridos, compuesto de almohadas, asientos de lona con armadura de madera, atalajes para dos caballos, uno de ellos á la Daumont, bastes para artolas, idem para artolas-literas, cabeceras de hierro estañado, cinturones de cuero, cojines, correas para estribos de artolas, cubiertas de cuti, estribos de madera, juegos de correas de cuero para artolas-literas, lienzo para camillas, porta-camillas, porta-sillas, varas de haya para camillas con casquillos y topes de hierro estañado. Ademas existen preparadas camillas, sillas, artolas, artolas-literas y carruages de trasporte.

La expedicion que de Cuba salió, en 1860, para Méjico, cuando la intervención anglo-franco-española en aquella República, fué provista como dije antes de cuantos recursos sanitarios y aprestos de campamento se conocían por entonces, remitiendo además el Parque de Madrid, material nuevo de ambulancia, tiendas de campaña, botiquines, furgones para trasporte de material y utensilio de farmacia, utilizándose tan valioso convoy sanitario en las operaciones de avance del ejército expedicionario.

Al tener lugar la campaña de Santo Domingo, el Parque de Cuba facilitó también en abundancia material sanitario, á aquel ejército, que servió para organizar las numerosas enfermarias que hubo necesidad de improvisar. También en dicha guerra se hicieron uso de los hospitales flotantes, empleándose varios buques-hospitales que prestaron gran servicio pues facilitaron la evacuación de heridos y enfermos; debiendo significar que ya en nuestra guerra de Africa, nuestro ejército estableció el trasporte de heridos y enfermos por buques-hospitales, y tuvimos tambien hospitales-flotantes para los coléricos, adelantándose el cuerpo de sanidad militar español, á lo que tiempo después se hizo en la guerra de Italia, y en gran escala en la de secession americana, al utilizar las vias fluviátiles y marítimas para la pronta diseminación de los enfermos.

Es pues, el parque sanitario, el depósito de donde se surten los cuerpos y establecimientos militares, á cuyo fin se lleva una contabilidad particular reglamentada, pues cuenta con personal de plana mayor compuesto de un médico mayor director jefe del parque, un jefe médico encargado del detall, un jefe de administración militar que interviene la contabilidad, y dos oficiales administrativos, uno de ellos pagador, y otro encargado de los efectos, con cuyo personal de sanidad y administración, se constituye la junta económica que verifica las compras, hace las subastas de materiales, y rinde las cuentas al estado de la inversión de los fondos y caudales destinados á la adquisición de los efectos sanitarios, así como de las ventas que se hacen á los cuerpos. Para el servicio, existe un personal sanitario compuesto de sargentos, cabos, y soldados para la limpieza, oficinas, etc., así como personal civil de conserge, mozos, mecánicos y obreros.

El material sanitario que como propiedad particular poseen los cuerpos del ejército (regimientos, escuadrones, baterías, etc.), está dispuesto en reglamentos especiales, y podemos dividirlo en varios grupos.

Material de alojamiento.—Tiendas de campaña que las usuales entre nosotros son de dos classes: cuadrilongas de 12 metros ó de 5 metros; y cónicas de 6 metros ó de 4 metros. Dichas tiendas son de fácil manejo, como puede verse por los modelos que se acompañan.*

Material de curacion, que esta constituido por medicamentos simples, compuestos químicos, preparados oficinales, instrumentos de cirugía, vendajes y apósitos, utensilio de farmacia, utensilio de ambulancía, objetos de alumbrado, objetos de escritorio y objetos accesorios, formandose con todo, los *botiquines* de los regimientos de

* Esperamos poder acompañar modelos de todo nuestro material sanitario para presentarlo al Congreso, á cuyo fin lo interesamos de la autoridad competente.

infantería, cuyo modelo varía poco del de caballería. Está compuesto de dos cajas, divididas en compartimentos donde se guardan los efectos; de un baste con arreos, de una cubeta para agua, una bota para vinagre y una cubierta de carga. Los vendajes de éste botiquin representan 200 curaciones ordinarias, 3 especiales (fracturas), y 6 imprevistas.

Además de los botiquines, tienen los cuerpos de infantería la mochila de ambulancia que llevan los soldados practicantes, y en las que existen representadas 60 curaciones. Los escuadrones de caballería llevan un maletín de grupa, análogo en su objeto á la mochila de infantería, pero que va colgada en la silla del caballo.

Por separado las secciones de infantería poseen una bolsa de ambulancia que representa 30 curaciones y otra de compañía con 20.

Material de trasporte de heridos, lo forman las camillas, sillas, artolas, etc. Cada regimiento posee varias de éstas, siendo la camilla española quizás la mas sencilla de cuantas se emplean en los trasportes, por su fácil desarme, como podrá verse en el modelo; la camilla-litera lleva su cubierta de gutta-percha con dos ventiladores.

Las ambulancias urbanas que tanta importancia tienen bajo el punto de vista de la higiene pública, establecidas primero en New York, y después en Paris, por escitacion de los Drs. Galippe y Brémond, en 1881, son tambien reglamentarias entre nosotros desdes 1887, para la conducción de los enfermos y heridos, desde los cuarteles á los hospitales.

En nuestro ejército de Cuba se empezaron á usar, en 1890, que la estableció por mis gestiones el batallón de artillería, en que presto servicio, y nada diré de su buen resultado, pues en ninguna plaza como en la Habana es de mas necesidad que los soldados que pasan al hospital, vayan conducidos en un buen carruaje, pues la naturaleza infecciosa de las enfermedades predominantes, exige el cumplimiento de todos los preceptos higiénicos.

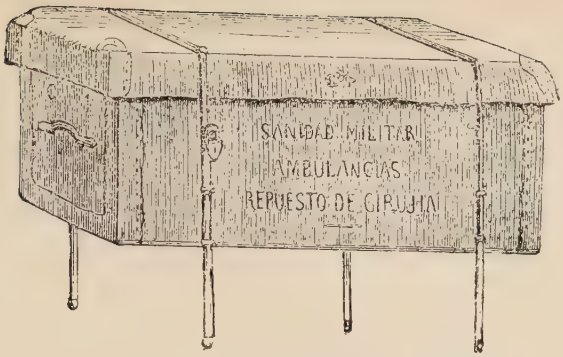
Acompaño una fotografía de la ambulancia urbana que posee éste batallón de artillería, y de paso significaré que ha sido construida aqui, en la Habana, y que no desmerece de carruajes análogos que he visto en los Estados Unidos y en Francia, así como en Londres, in 1884, en la Exposicion de Higiene que allí se celebró.

He dicho que en las guerras irregulares no es posible utilizar casi ningún material de ambulancias del adoptado por los ejércitos; y efectivamente, esto ha sucedido en la campaña sostenida en Cuba. Ciertamente que todos los cuerpos han estado dotados del material sanitario reglamentario que hemos indicado; pero la índole de las operaciones de la campaña hacia imposible llevar esa impedimenta de trasporte. El terreno de la guerra estaba desprovisto de carreteras y caminos, siendo preciso que las columnas fueran abriendose paso á través de la espesa cortina de follage, de la enmarañada red que forman en este país de exuberante vegetacion las plantas rastreras y trepadoras, los bejucos y llevas, arbustos y lianas que constituyen lo que llamamos manigua.

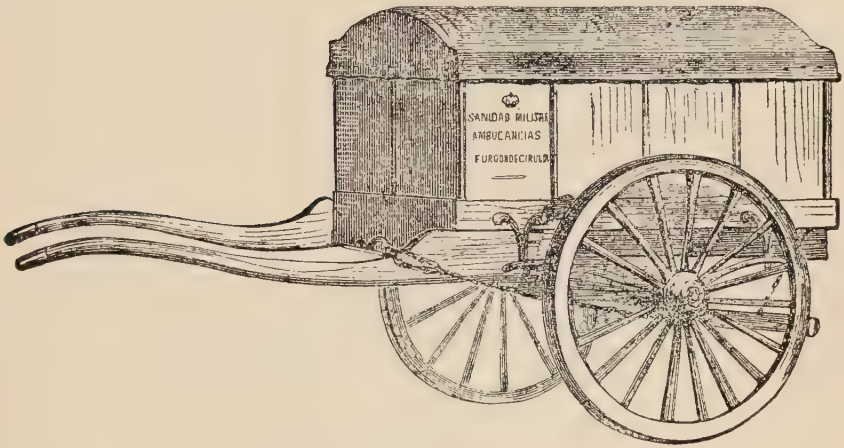
Imposible dar paso á carros, furgones, camiones y demas vehículos de trasporte por los terrenos pantonosos, siguaneas ó tembladeras. Tan solo las acémilas, y para eso, no siempre han podido llevar los botiquines, pues el paso de los rios y arroyos naturales, de los charcos y lagunas formados por las lluvias, se ha hecho muchas veces imposible para las caballerías. ¡Cuantas veces la espesura de los potreros y sabanas ha impedido el paso de las bestias!

Los botiquines de los cuerpos han permanecido casi siempre en los campamentos que eran centro de operaciones de las brigadas, ó zonas de los batallones; no careciéndose de material de curación, porque cada compañía tenia su bolsa reglementaria, cada batallón su modúla, cada escuadrón ó batería su maletín de grupa; llevando ademas cada soldado una pequeña bolsa de socorro que contenia lo preciso para una cura. He ahí como pudieron ser atendidas las necesidades en el campo de batalla, y como los médicos de sanidad militar pudieron verificar después de una acción de guerra la curación de todos sus heridos.

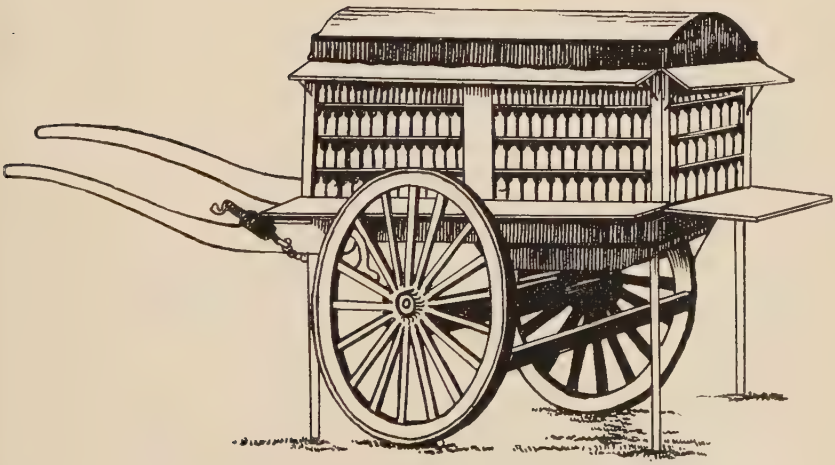
Hemos mencionado la camilla española, las sillas y artolas de que estan dotados los cuerpos de la Isla en operaciones, pero tampoco este material ha podido ser con-



Repuesto de cirugía

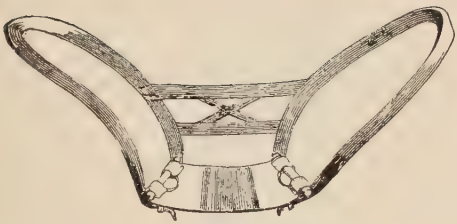


Furgón con material de cirugía.

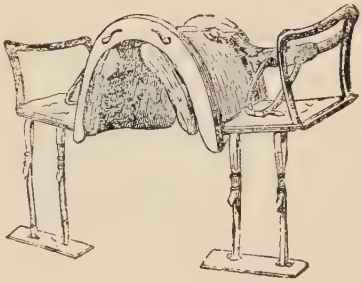


Furgón de farmacia

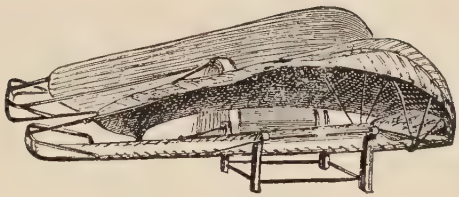
Camilla española.



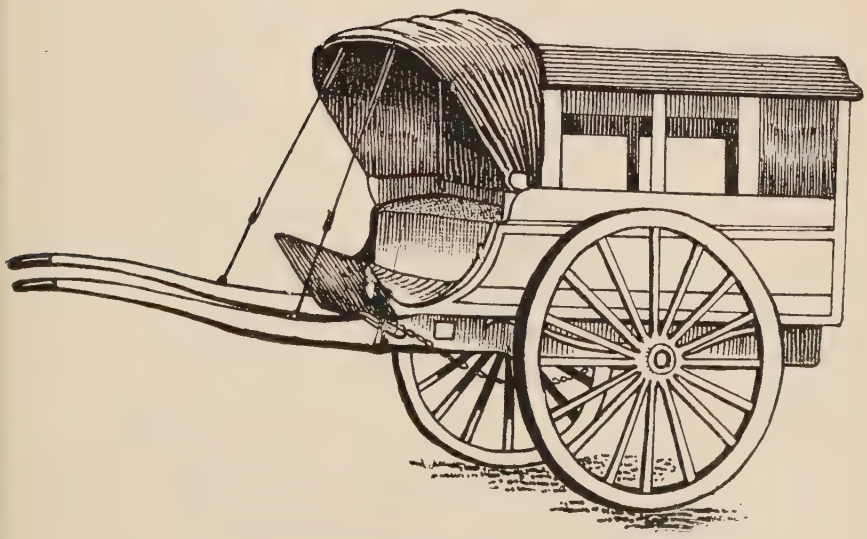
Silla sueca modificada por Auguiz.



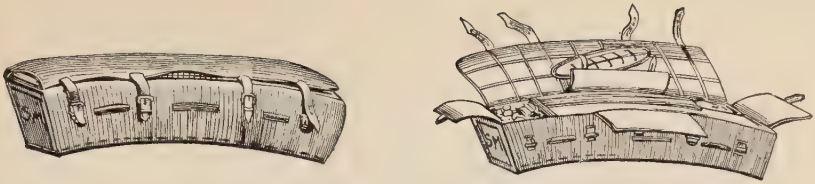
Artola



Artola-litera.

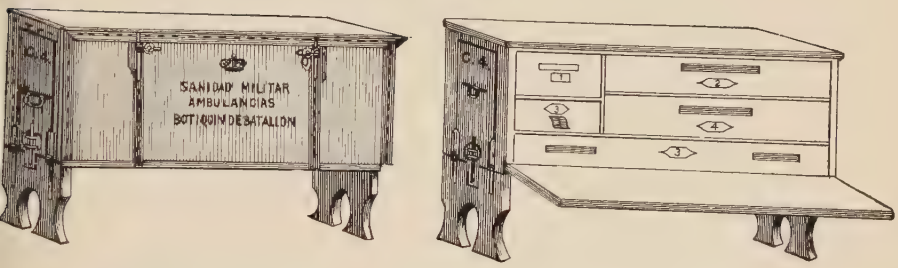


Carruaje español para heridos.



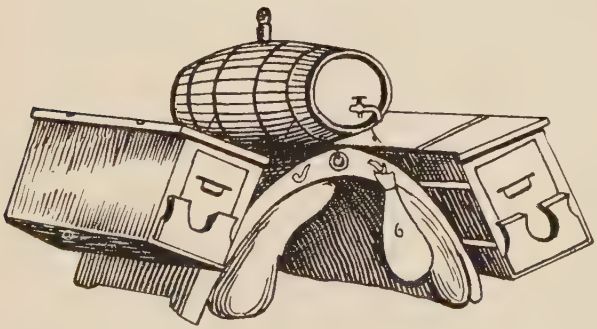
Maletín de grupa para los regimientos de caballería.

Mochila de infantería.



Caja-botiquín cerrada.

Caja-botiquín abierta.



Baste con los botiquines para cargar.

APRESTOS DE CAMPAMENTO. EJÉRCITO ESPAÑOL EN CUBA.

Ambulancia urbana del 10º batallón de artillería.

APRESTOS DE CAMPAMENTO. EJÉRCITO ESPAÑOL EN CUBA.

ducido, apesar de sus facilidades para el desarme. Las sillas y artolas necesitan cabalgaduras, y ya indicamos la dificultad que para los mulos y acémilas en general ofrecen los campos, por las enramadas de sus bosques vírgenes, máxime en la epoca de las lluvias que son torrenciales y se prolongan algunos meses entre nosotros. Pero la necesidad hace milagros, y nuestros compañeros improvisaron casi siempre las camillas, armando parihuelas como en los primitivos tiempos, con ramas de los frondosos árboles que por doquier se encuentran, y un pedazo de lona ó la tela de la hamaca prenda reglamentaria en esta campaña; y aun á falta de ésta se utilizaba la *yagua** y por medio de bejucos ó lianas, nuestros hábiles soldados entretegian con suma rapidez una armazon ó enrejado sobre el que se colocaba una manta de las que iban provistas todos los individuos.

La inventiva suplió siempre en todos los casos la necesidad; y así como al principio de hacer la guerra, todo era difícil, á poco de estar en ella se habituaba uno á cubrir el servicio y salvar todas las dificultades. Ejemplo de ello, las muchas enfermerías improvisadas en los campamentos, la facilidad con que estos se levantaban y luego se destruían al abandonarlos.

Nuestros oficiales y soldados con su espíritu valiente y sufrido, animados por el cumplimiento del deber, conviértense pronto á las costumbres del campesino criollo, del *guajiro*, y siguiendo el ejemplo que ellos le daban, aprovechaban cuantos elementos les brindaba la pródiga naturaleza. Por nuestra parte, los médicos, esforzando también el cumplimiento de nuestra misión, no nos amilanábamos; y de ahí que apesar de la inclemencia del clima, de las epidemias, de las necesidades que lleva en si una lucha prolongada entre hermanos, hemos salido con una estadística de heridos y enfermos, que el dia que se estudie detenidamente podrá desvirtuar la idea que existe de que ésta guerra ha sido fatal por el número de defunciones. Tan solo como una muestra de la veracidad de nuestro aserto citarémos la estadística del tétanos en Cuba, durante el decenio de 1869 á 1879 que duró la campaña:

TÉTANOS.

Años.	Traumático.	Espontáneo.	Total.
1869	25	5	30
1870	37	5	37
1871	17	3	20
1872	17	2	19
1873	8	3	11
1874	23	3	26
1875	13	5	18
1876	18	6	24
1877	16	5	21
1878	5	1	6
1879	2	1	2
En diez años	181	33	214

Compárense estas cifras con las de cualquiera de las campañas modernas, y sus resultados vendrán á darnos la razón; y eso que debe tenerse en cuenta las causas predisponentes que se asignan á éste clima para esta complicación de las heridas, y la facilidad con que espontáneamente se presenta en este país.

La gangrena hospitalaria, apenas se ha visto en nuestros hospitales de campaña, y menos aún en las enfermerías de campamento.

Pero no nos salgamos de nuestro tema, y deigmos como se improvisaban las enfermerías, pues á ellas se debe quizás en parte el éxito de nuestras estadísticas. Para muchos de los congresistas es conocido lo que en las Antillas llamamos *bohios;* una barraca formada con cuatro ramas gruesas de árbol terminadas en bosqueta, un caballete como armazón de techo y una cobija hecha con guano ó séase las hojas

* Parte del peciolo de las hojas de las palmeras.

secas de las palmeras—"adorno obligado de todo paisaje cubano," como decia nuestro naturalista Poey; las paredes constituidas por yagüas: he ahí una casa de campo en nuestro país. Mas sencillos aun son los bohios llamados de vara en tierra cuya construccion se hace mas fácil y rápidamente, pues viene á ser un caballete apoyado ó clavado en el suelo, con bastante inclinación para que corran las aguas.

¿Las camas?... ya dije que la hamaca era prenda reglamentaria y muchas veces han servido para el descanso de los calenturientos; y cuando se han querido improvisar catres, en seguida se construian con cuatro horquillas cortadas en el monte, clavadas en tierra, que sostenian cuatro ramas delgadas; y en el sentido longitudinal se adaptaban ramas de cujes, que liado todo con bejucos constituian un camastro flexible, sobre el que se colocaba una manta ó la tela de la hamaca, descansando con cierta comodidad el herido, amputado, ó enfermo.

La renovación del aire en estas enfermerías era constante por las rendijas de los materiales de construccion, y por aberturas á manera de ventanas que se les hacían; y como todo era provisional al evacuar estas enfermerías se destruian, para rehacerlas en otro lugar.

En los trasportes de muchos heridos ó enfermos empleáronse los carros del país, cuyas grandes ruedas permitian la marcha á través de los caminos primitivos que existian; no siendo en ningún caso posible el trasporte en otros vehículos y menos en las ambulancias, que se desecharon desde un principio por ser imposible utilizarlas.

El único trasporte empleado lógicamente fué el de via fluviátil ó marítima, y para ello se emplearon vapores que ya por el rio Cauto navegable, ya por las costas norte y sur, repartían los enfermos y heridos en los hospitales de planta fija que existían en todos los puertos del litoral.

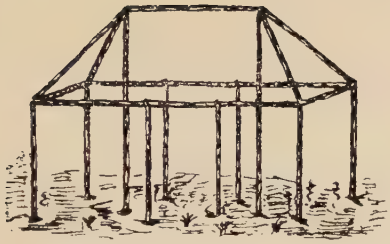
Respecto á las tiendas de campaña ni siquiera se intentó su uso, siguiendo en esto las frases de Napoleón: "Las tiendas no son sanas, vale mas que el soldado vivaquee." Nuestros campamentos eran verdaderos vivacs, y como dice muy bien un distinguido jefe de nuestro estado mayor, hablando sobre los campamentos de tiendas en Cuba: "La temperatura elevada y la abundosa humedad, hubieran bastado para proscribir las tiendas, aún en el caso de que hubiéramos llegado á salvar y connaturalizarlas con el esceso de material é impedimenta que hubieran representado."

La riqueza de materiales de construcción, la abundancia de maderas, permitía improvisar con gran celeridad los bohios según hemos indicado, y estos valian cien veces mas que cualquiera tienda de lona, aquí donde las lluvias se derraman en agüaceros torrenciales.

Pero no eran solo las enfermerías lo que se improvisaba para la asistencia de los enfermos y heridos. La riqueza de la vegetación del campo de Cuba ofrece elementos variados para llenar muchas necesidades; abundando el ramaje, varas, troncos, bejucos, majagua, yaguas, guano, hojas y frutos de que se saca gran partido. Así con las güiras secas * formábanse vasijas grandes y chicas para líquidos, empleándose en las enfermerías en vez de vasos, tazas, jofainas, etc.; con las yaguas † además de su aprovechamiento en los edificios se hacian carvastas, que reciben en el país el nombre de *catauros*, y sirven hasta para contener líquidos; la majagüa (*Hibiscus tiliaceus*) y otras muchas plantas textiles ofrecian sus fibras elásticas, resistentes para ligaduras; las ceibas (*Bombax ceiba*), los ceibones (*Paquira emarginata*), y las guarimas (*Guazuma ulmifolia*), facilitaban lana para llenar cabezales; en fin, todo médico que llevase unos meses de campaña poseía un arsenal en la riquísima vege-

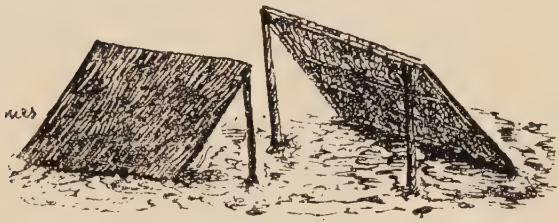
* Fruto de la *Crescentia cucurbitina*, cuyo pericarpio es leñoso.

† Indicamos antes se llaman así las hojas de la palma real (*Oreodoxia regia*): La base de estas hojas se prolongan hasta metro y medio envolviendo al estipite que forma el tallo. En cada período lunar se desprende una de estas espansiones del peciolo, que cuando verdes son tan elásticas y consistentes que pueden desgajarre para formar cuerdas llamadas *ariques*. Estas espansiones, llamadas *yaguas*, tienen el aspecto de pieles curtidas, pero en estado fresco son muy flexibles, aprovechándolas para embalar el tabaco y otros muchos usos.



Armazón de un bohio.

Bohio cerrado.



Bohio de varas en tierra.

Hamacas tendidas en el bosque.

APRESTOS DE CAMPAMENTO. EJÉRCITO ESPAÑOL EN CUBA.

tacion tropical, y sabía aprovecharse de la pródiga naturaleza de este privilegiado país.*

Nada dirémos de los productos medicinales, pues aunque no faltaron nunca medicamentos, sobretodo la quinina y sus sales, el formulario de los hospitales militares de Cuba contiene un índice ó repertorio de plantas medicinales utilísimas en campaña, que fueron muchas veces empleadas.

Terminarémos para no hacer pesado este trabajo, con las frases de un historiador militar de esta guerra que dice: "En la campaña de Cuba ni se operó, ni puede operarse en grandes columnas" "La clase de guerra de Cuba sí ha de sostenerse con éxito, es indispensable que lleve en sí cierta irregularidad"—frases que encierran una gran verdad, y que nosotros plagiarémos repitiendo lo dicho ántes: "No todos los aprestos de campamento usuales en los ejércitos que operan en grandes columnas tienen aplicación en las campañas que pueden ocurrir en este país;" "Dada la irregularidad que demanda aquí la guerra, los médicos tienen que improvisar nuevos aprestos sanitarios, supliendo con su práctica las deficiencias, y acudiendo á la inventiva para llenar las necesidades imprevistas; y saldrán siempre victoriosos, pues la rica naturaleza de Cuba les brinda por doquier con elementos para satisfacer las exigencias de los servicios de campaña."

ESTADÍSTICA GENERAL DE ENFERMOS ASISTIDOS EN LOS HOSPITALES Y ENFERMERÍAS MILITARES DE LA ISLA DE CUBA DURANTE LA CAMPAÑA, Ó SEA DESDE 1º DE NOVIEMBRE DE 1868 Á FIN DE JUNIO DE 1878.

Por el Dr. JOSÉ CLAIRAC, *Capitan Cirujano, del Egército Español, Habana.*

Movimiento general de enfermos asistidos en los hospitales y enfermerías de la Ysla de Cuba durante la campaña, ó sea desde 1º de noviembre de 1868 á fin de junio 1878.

VIRUELAS.

Años.	Existencia anterior.	Entrados.	Salidos.	Muertos.	Quedan.
1868	5	103	88	14	6
1869	6	652	463	187	8
1870	8	741	496	205	48
1871	48	457	394	86	25
1872	25	151	140	36	0
1873	0	80	44	30	6
1874	6	480	271	151	64
1875	64	474	340	158	40
1876	40	370	283	85	42
1877	42	86	107	18	3
1878	3	66	45	20	4
Quedan	5	3,660	2,671	990	4

FIEBRE AMARILLA.

1868	14	1,107	463	329	329
1869	329	4,581	2,841	1,947	122
1870	122	5,683	3,449	2,276	85
1871	85	3,449	1,949	1,472	113
1872	113	5,372	2,904	2,503	78
1873	78	2,893	1,885	1,040	46
1874	46	1,038	656	424	4
1875	4	2,033	1,085	901	51
1876	51	6,641	3,692	2,849	151
1877	151	5,495	2,279	3,269	98
1878	98	710	281	430	97
Totales	14	39,007	21,484	17,440	97

*Sus frutos comestibles en buena sazon aprovechaba, á los convalecientes, recordando todos con placer el agua del coco (*Cocus nucifera*) bebida agradable. La abundancia de colmenas permitia castrar sus panales y recoger miel de excelente calidad que facilitaba la confección de jarabes y líquidos dulces.

CÓLERA.

Años.	Existencia anterior.	Entrados.	Suman.	Salidos.	Muertos.	Quedan.
1868	----------	813	813	484	329	----------
1869	----------	3,932	3,932	1,945	1,967	20
1870	20	3,051	3,071	1,614	1,453	4
1871	4	912	916	333	539	144
1872	44	576	620	193	421	6
1873	6	46	52	24	28	----------
1874	----------	550	550	262	288	----------
1875	----------	----------	----------	----------	----------	----------
1876	----------	----------	----------	----------	----------	----------
1877	----------	2	2	----------	2	----------
1878	----------	----------	----------	----------	----------	----------
Totales	----------	9,882	----------	4,855	5,027	----------

Movimiento general de heridos asistidos en los hospitales y enfermerías de la Isla de Cuba, durante la campaña ó sea desde 1º noviembre de 1868 á fin de junio de 1878.

HERIDOS.

Años.	Existencia anterior.	Entrados.	Suman.	Salidos.	Muertos.	Quedan.
1868	----------	543	543	453	13	77
1869	77	1,936	2,013	1,702	175	136
1870	136	2,479	2,615	2,267	198	150
1871	150	2,116	2,266	1,881	177	208
1872	208	1,691	1,899	1,649	126	124
1873	124	1,936	2,060	1,740	116	204
1874	204	3,476	3,680	3,334	213	133
1875	133	2,044	2,177	1,820	158	199
1876	199	1,768	1,967	1,696	96	175
1877	175	1,841	2,016	1,692	149	175
1878	175	648	859	697	53	109
Totales	----------	20,514	----------	18,931	1,474	109

Resumen general de los enfermos asistidos, salidos y fallecidos en los hospitales y enfermerías de la Isla de Cuba durante la campaña, ó sea desde el 1º de noviembre de 1868 á fin de junio de 1878, con demostración del tanto por ciento.

MUERTOS.

Enfermedades.	Enfermos asistidos.	Curados.	Muertos.	Tanto por ciento entre asistidos y fallecidos.
Heridos	20,514	18,931	1,474	7.170
Fiebre amarilla	39,007	21,484	17,440	44.709
Cólera	9,882	4,855	5,029	50.890
Viruelas	3,665	2,671	990	24.283
Demás enfermedades	993,150	941,467	41,824	4.211
Totales	1,066,218	989,908	66,757	6.257

FALLECIDOS POR CUERPOS.

Marina	3,422
Artillería	2,827
Caballería	3,138
Infantería	30,373
Cuerpos auxiliares	5,619
Milicias y voluntarios movilizados	19,440
Prisioneros, servientes y demás clases, que no entran en la anterior clasificación	1,942
Total	66,757

CLASIFICACIÓN POR CLASES.

Jefes y oficiales	660
Tropa	66,097
Total	66,757

Resumen general del movimiento de enfermos habidos en los hospitales y enfermerías militares de la Isla de Cuba durante la campaña, ó sea desde 1º de noviembre de 1868 á fin de junio de 1878.

Años.	Existencia, anterior.	Entrados.	Suman.	Salidos.	Muertos.	Quedan.	Hospitalidades.
1868	667	15,010	15,677	14,295	758	624	327,206
1869	624	70,251	70,875	61,316	5,675	3,888	1,133,952
1870	3,888	85,261	89,149	78,178	6,339	4,632	1,461,158
1871	4,632	83,770	88,402	78,117	4,782	5,503	1,804,574
1872	5,503	98,600	141,103	93,174	6,121	4,808	2,142,203
1873	4,808	81,756	86,564	77,224	3,448	5,892	1,797,958
1874	5,892	135,427	141,319	129,336	4,749	7,234	2,482,386
1875	7,234	104,432	111,666	99,856	5,320	6,490	2,251,320
1876	6,490	134,879	141,369	123,536	8,482	9,351	2,641,325
1877	9,351	184,552	193,903	165,470	16,170	12,263	4,129,463
1878	12,263	72,280	84,543	69,406	4,916	10,221	1,692,212
Totales...	6,667	1,066,218	.....	989,908	66,756	10,221	21,833,757

6.257 por ciento.

MEMORIA-RESUMEN DE LA ESTADÍSTICA SANITARIA DEL EJÉRCITO ESPAÑOL CORRESPONDIENTE AL AÑO 1891.

Por Pedro Peñuelas,

Inspector Cirujano del Ejército Español.

Al comenzar este trabajo el jefe que tiene la honra de dirigirse á V. E. pudiera empezar con las mismas palabras, estampadas en el resumen estadístico perteneciente al ejército de la Península y distritos ultramarinos correspondientes al año de 1890, y publicada en 11 de mayo del actual año.

En efecto; en la fecha citada no se habían publicado todavía las estadísticas extranjeras, y ahora, como entonces, tampoco tiene el negociado noticia de que se haya publicado ninguna estadística militar correspondiente el año de 1891.

Como no se mandan á esta inspección los datos que arrojan los trabajos militares publicados en Alemania, Francia, Italia, Austria, no puede asegurar terminantemente el negociado no se haya ejecutado en alguna de las expresadas naciones algún estudio estadístico del año que vamos á reseñar,* más como las revistas y los periódicos profesionales nada han publicado en el extranjero referente al año 1891 por lo que respecta á los organismos armados, creemos estar en lo firme al asegurar no se ha escrito ningún trabajo estadístico referente á los ejércitos europeos que se relacione con el citado año de 1891.

En la imposibilidad, por tanto, de poder hacer un estudio comparativo entre nuestra estadística sanitaria y otra cualquiera extranjera, vamos á emprenderla, teniendo en cuenta solamente los datos que han arrojado las nuestras durante los años 1890-91.

La fuerza en revista que tuvo el ejército de la Península durante el año de 1891 ascendió, por término medio, á 80,968 individuos imputables al ramo de guerra.

De ellos se asistieron en los hospitales 36,711, que causaron 924,147 hospitalidades. De éstos hubo 33,810 salidos, 815 fallecidos, y quedaron en hospitales en 1º de enero de 1892, 2,056 individuos de la clase de tropa. El promedio de la hospitalidad causada por cada individuo fué de veinticinco estancias, y el término medio de la hospitalidad general diaria ascendió á 2,531.

El número de ingresados por cada mil hombres de la fuerza en revista, fué de 453 por mil, y como en el año 1890 ascendió á 509, resulta una ventaja de consideración á favor del año de 1891.

También el número de fallecidos ha sido menor en el año que venimos reseñando, puesto que en 1890 fallecieron 829 hombres de la clase de tropa y en 1891 hubo 815.

* Unicamente Inglaterra remitió á nuestro ministerio de la guerra la estadística del año de 1890, cuando ya hacia bastantes meses se había publicado la española.

El negociado tiene la mayor satisfacción en hacer constar que el número de fallecidos por cada 1,000 hombres de fuerza en revista, va disminuyendo paulatinamente de tres años á esta parte. Así se ve que el año 1889 ascendió la proporcionalidad de fallecidos á 10.92 por mil hombres de fuerza en revista; en 1890 á 10.44 y en 1891 á 10.06. Como se ve, ha descendido cerca de un entero en este último año comparado con el de 1889. Dato halagüeño que el negociado hace constar con el mayor gusto, con tanta más razón cuanto el término medio de la fuerza en revista ha sido mayor el año 1889 que el 1890.

Para dar una idea ligera de las fuerzas asistidas en los hopitales militares y cívico-militares durante el año que venimos reseñando, vamos á dar á continuación dos estados en que se detalla el movimiento hospitalario por armas, imputables y no imputables al ministerio de la guerra.

IMPUTABLES.

Armas.	Asistidos.	Hospitalidades.	Salidos.	Muertos.	Quedan.
Infantería	24,938	609,598	23,049	563	1,326
Caballería	5,207	142,104	4,742	126	339
Artillería	4,093	113,457	3,764	69	260
Ingenieros	1,890	45,692	1,764	43	83
Brigada topográfica	2	20	1	1	.....
Administración	447	10,257	394	8	45
Sanidad	134	3,019	126	5	3
Inválidos	.....	.....	.....	.....	.....
Totales	36,711	924,147	33,840	815	2,056

NO IMPUTABLES.

Jefes y oficiales	130	6,220	98	13	19
Guardia civil	601	16,772	540	24	37
Carabineros	670	16,275	606	16	48
Ultramar	942	36,117	857	28	57
Marina	369	9,527	325	4	40
Diversos	1,622	48,352	1,494	51	77
Totales	4,334	133,333	3,920	136	178

El movimiento por distritos de la fuerza imputable y no imputable al ministerio de la guerra ha sido el siguiente, durante 1891:

IMPUTABLES.

Distritos.	Asistidos.	Hospitalidades.	Salidos.	Muertos.	Quedan.
Castilla la Nueva	7,196	183,994	6,607	156	433
Cataluña	4,094	124,007	3,780	79	238
Andalucía	4,062	91,551	3,806	54	202
Valencia	2,553	67,548	2,338	52	153
Galicia	1,996	51,730	1,839	50	107
Aragón	2,114	55,055	1,954	59	101
Granada	3,140	82,287	2,904	73	163
Castilla la Vieja	2,613	61,660	2,411	77	123
Extremadura	1,105	24,246	1,039	18	48
Navarra	928	23,548	809	29	90
Vascongadas	2,975	63,247	2,665	56	254
Burgos	2,067	50,515	1,904	81	82
Baleares	693	17,944	661	4	28
Canarias	364	6,295	350	4	10
Ceuta	811	15,527	773	12	25
Totales	36,711	924,147	33,840	815	2,056

NO IMPUTABLES.

Distritos.	Asistidos.	Hospitalidades.	Salidos.	Muertos.	Quedan.
Castilla la Nueva	386	12,674	340	20	26
Cataluña	561	23,501	496	18	47
Andalucía	792	15,772	752	16	24
Valencia	463	17,641	422	16	25
Galicia	262	7,208	231	7	24
Aragón	74	2,675	64	5	5
Granada	1,068	29,250	977	27	64
Castilla la Vieja	63	1,419	56	4	2
Extremadura	77	2,763	71	1	5
Navarra	35	1,613	31	3	1
Vascongadas	101	2,435	90	3	8
Burgos	141	3,717	127	3	11
Baleares	113	3,768	106	1	6
Canarias	76	2,277	65	2	9
Ceuta	123	9,580	92	10	21
Totales	4,334	133,333	3,920	136	278

Las proporcionalidades de fallecidos en los distritos, ha sido la siguiente:

Distritos.	Muertos.		Distritos.	Muertos.	
	Año 1890.	Año 1891.		Año 1890.	Año 1891.
Castilla la Nueva	11.92	10.18	Extremadura	4.75	9.55
Cataluña	11.24	7.38	Navarra	9.08	10.78
Andalucía	8.44	6.80	Viscongadas	7.91	9.69
Valencia	5.91	7.71	Burgos	17.46	14.98
Galicia	12.64	17.69	Baleares	3.28	3.41
Aragón	11.53	10.67	Canarias	1.51	3.54
Granada	6.67	14.80	Ceuta	5.03	7.78
Castilla la Vieja	20.63	18.70			

Como se ve, los distritos más castigados han sido Castilla la Vieja, Galicia, Granada y Burgos; y los menos Baleares y Canarias. Se ve continúa la mortalidad en los distritos de referencia, lo cual indica siguen subsistentes las causas que producen aquélla, y de las que nos hemos ocupado en trabajos anteriores.

La mortalidad por grupos morbosos, es la siguiente: Medicina, 34.03; cirujía, 4.97; tuberculosis, 280.07; viruela, 115.83; heridas, 18.26; venéreo, 0.15, y comprobación, 31.58. Se nota una baja bastante acentuada en la clínica de tuberculosis, comparada con el año 1890, en el que ascendía la mortalidad á 345 por 1,000 en la clínica de referencia.

El resumen necrológico comparativo por cuerpos fué el que á continuación copiamos:

Armas.	Muertos.		Armas.	Muertos.	
	Año 1890.	Año 1891.		Año 1890.	Año 1891.
Infantería	10.50	10.36	Ingenieros	7.81	9.48
Caballería	13.17	10.36	Sanidad	1.95	10.18
Artillería	8.70	8.09	Administración	9.30	8.69

Se ve por el anterior resumen que las armas más castigadas han sido infantería y caballería, y la menos artillería.

ESTADÍSTICAS ESPECIALES.

Fiebres tifoideas.—Esta afección ha ocasionado la muerte á 146 soldados de infantería, 32 de caballería, 18 de artillería, 16 de ingenieros, 2 de administración y 3

de sanidad, ó sean 219. Como el año 1890 fallecieron 154, resulta desgraciadamente un aumento de consideración comparado con el año anterior. La proporcionalidad por cada 1,000 hombres de fuerza en revista ha sido la siguiente:

Distritos.	Muertos.		Distritos.	Muertos.	
	Año 1890.	Año 1891.		Año 1890.	Año 1891.
Castilla la Nueva	1.38	2.21	Vascongadas	2.02	1.73
Cataluña	2.66	2.52	Navarra	1.81	3.66
Andalucía	1.51	1.13	Extremadura	0.52	2.65
Valencia	0.69	1.71	Burgos	3.81	3.69
Galicia	2.66	8.84	Baleares	1.64	
Granada	1.72	4.00	Canarias		0.88
Aragón	2.52	3.07	Ceuta	4.40	2.36
Castilla la Vieja	3.56	4.85			

Se ve que los distritos más castigados han sido en el año 1891, Galicia, Granada y Castilla la Vieja, y los menos Baleares y Canarias.

La proporcionalidad por armas ha sido la siguiente:

Armas.	Muertos,		Armas.	Muertos.	
	Año 1890.	Año 1891.		Año 1890.	Año 1891.
Infantería	1.85	2.68	Ingenieros	1.30	3.52
Caballería	3.25	2.62	Administración	1.16	2.16
Artillería	1.22	2.11	Sanidad		6.10

Se ve que en general las proporcionalidades han sido más elevadas en el año que venimos reseñando que en el anterior, y que sanidad ha tenido la cifra más elevada de mortalidad, sin duda por el contagio directo á que sus individuos se exponen en las salas de los hospitales.

Tuberculosis pulmonar—Las cifras de muertos é inútiles de esta terrible enfermedad durante el año de 1891, han sido las siguientes:

Armas.	Muertos.	Inútiles.	Armas.	Muertos.	Inútiles.
Infantería	84	246	Administración		4
Caballería	18	55	Sanidad	2	1
Artillería	10	42			
Ingenieros	11	23	Totales	125	371

Como en el año de 1890 fallecieron de tuberculosis 168 individuos, y en el año 1889, 190, resulta una notable mejoría en el año que venimos reseñando.

Las proporcionalidades de asistidos, muertos é inútiles en el año de 1891, por cada 1,000 hombres de fuerza en revista, han sido las que se detallan en el siguiente cuadro:

Distritos.	Asistidos.	Muertos.	Inútiles.	Distritos.	Asistidos.	Muertos.	Inútiles.
Castilla la Nueva	6.13	1.76	4.37	Vascongadas	9.52	1.09	7.61
Cataluña	5.88	0.74	5.13	Navarra	9.90	1.10	8.80
Andalucía	10.34	2.02	8.32	Extremadura	3.71	1.59	2.12
Valencia	1.82	0.34	1.36	Burgos	6.10	1.84	4.62
Galicia	9.19	3.53	5.65	Baleares	3.22	0.92	2.30
Granada	3.80	2.20	1.60	Canarias	3.54	1.77	1.77
Aragón	7.05	1.44	5.60	Ceuta	1.18	1.18	
Castilla la Vieja	5.58	2.18	2.91				

Se ve que el distrito más castigado por defunciones ha sido Galicia, y el menos Valencia.

La proporcionalidad de fallecidos por armas ha sido la siguiente en ambos años:

Armas.	1890.	1891.	Armas.	1890.	1891.
Infantería	2.07	1.54	Ingenieros	2.82	2.42
Caballería	2.74	1.47	Administración	3.48	.....
Artillería	1.22	1.17	Sanidad	.....	4.73

Se ve que en el año 1891 sanidad acusa la mayor mortalidad y administración la menor.

Paludismo.—Han fallecido de esta enfermedad en el año que venimos reseñando 12 hombres de Infantería y ninguno en las demás armas. Como en el año 1890 fallecieron 21 y en el 1889 23, resulta una gran disminución á favor del que venimos reseñando.

La proporcionalidad por distritos es la siguiente en el año 1891:

Distritos.	Asistidos.	Muertos.	Distritos.	Asistidos.	Muertos.
Castilla la Nueva	22.26	1.51	Vascongadas	4.67	.....
Cataluña	1.96	0.18	Navarra	1.46	.....
Andalucía	35.81	.....	Extremadura	31.84	1.06
Valencia	12.66	0.11	Burgos	7.02	.....
Galicia	3.18	.....	Baleares	12.44	.....
Granada	37.21	0.80	Canarias	4.42	.....
Aragón	1.99	.....	Ceuta	27.79	1.18
Castilla la Vieja	14.33	.....			

Los distritos más castigados han sido Castilla la Nueva, Extremadura y Ceuta, respecto á fallecidos, y los menos Galicia, Aragón, Castilla la Vieja, Vascongadas, Navarra, Burgos, Baleares y Canarias.

La proporcionalidad de asistidos y muertos por armas ha sido la siguiente:

Armas.	Asistidos.	Muertos.	Armas.	Asistidos.	Muertos.
Infantería	15.20	0.22	Ingenieros	14.55	.....
Caballería	17.56	.....	Administración	17.14	.....
Artillería	12.91	.....	Sanidad	6.10	.....

Venéreo.—Han sido asistidos en hospitales 3,006 individuos de infantería, 1,257 de caballería, 693 de artillería, 434 de ingenieros, 146 de administración y 19 de sanidad; de éstos han fallecido 1 en infantería y se ha concedido una licencia temporal en la misma arma.

Las proporcionalidades de asistidos y muertos en el año 1891 han sido las siguientes, por cada 1,000 sanos:

Distritos.	Asistidos.	Muertos.	Distritos.	Asistidos.	Muertos.
Castilla la Nueva	97.53	.....	Vascongados	25.97	.....
Cataluña	51.38	.....	Navarra	19.44	.....
Andalucía	116.51	0.12	Extremadura	143.84	.....
Valencia	50.87	.....	Burgos	19.78	.....
Galicia	98.33	.....	Baleares	59.44	.....
Granada	108.24	.....	Canarias	7.97	.....
Aragón	52.10	.....	Ceuta	49.67	.....
Castilla la Vieja	58.55	.....			

La proporcionalidad comparada por armas ha sido la siguiente:

Armas.	Asistidos.		Armas.	Asistidos.	
	1890.	1891.		1890.	1891.
Infantería	53.57	55.34	Ingenieros	72.04	95.74
Caballería	51.45	102.49	Administración	89.53	158.17
Artillería	68.41	81.33	Sanidad	31.25	38.69

Sífilis.—Tuvieron ingreso en los hospitales á consecuencia de esta afección 298 individuos de infantería, 91 de caballería, 66 de artillería, 34 de ingenieros, 5 de administración y 1 de sanidad.

Se declararon 3 inútiles en infantería, 2 en caballería y 1 en artillería; no hubo ningún fallecido.

La proporcionalidad por distritos ha sido la siguiente:

Distritos.	Asistidos.	Distritos.	Asistidos.
Castilla la Nueva	8.22	Vascongadas	1.90
Cataluña	5.79	Navarra	2.20
Andalucía	14.24	Extremadura	6.36
Valencia	0.79	Burgos	6.39
Galicia	13.44	Baleares	11.52
Granada	8.50	Canarias	4.22
Aragón	5.97	Ceuta	----------
Castilla la Vieja	3.88		

La proporcionalidad por armas es la siguiente:

Armas.	1890.	1891.	Armas.	1890.	1891.
Infantería	10.22	5.48	Ingenieros	18.88	7.50
Caballería	23.69	7.46	Administración	3.48	6.50
Artillería	13.60	7.74	Sanidad	5.85	4.07

Se ve que el arma más castigada fué artillería, y la menos sanidad.

Viruelas.—Se asistieron en los hospitales militares y cívico-militares de la Península 259 individuos; hubo 129 venidos de otras clínicas, 28 pasados, 306 salidos y 30 muertos, quedando el resto en tratamiento.

De los 30 fallecidos hubo 4 en Castilla la Nueva, 2 en Cataluña, 6 en Grenada, 3 en Vascongadas, 2 en Valencia, 5 en Aragón, 1 en Burgos, 4 en Galicia, 2 en Ceuta, y en Castilla la Vieja 1.

De éstos fallecieron 22 en infantería, 2 en caballería, 2 en artillería y 1 en administración. Total, 27; siendo el resto hasta 30 no imputables al ministerio de la guerra.

Los distritos más castigados han sido Granada, Aragón y Castillo la Nueva, y los menos Baleares y Extremadura.

Las proporcionalidades por armas han sido las siguientes:

Armas.	Muertos.	Armas.	Muertos.
Infantería	0.38	Ingenieros	----------
Caballería	0.15	Administración	1.08
Artillería	0.23	Sanidad	----------

Se ve que el arma más castigada ha sido administración, y la menos sanidad.

La proporcionalidad por distritos ha sido la siguiente:

Distritos.	Muertos, por 1,000 sanos.	Distritos.	Muertos, por 1,000 sanos.
Castilla la Nueva	0.19	Extremadura	.....
Cataluña	0.09	Navarra	.....
Andalucía	.....	Vascongadas	0.51
Valencia	0.22	Burgos	0.18
Galicia	1.41	Baleares	.....
Granada	0.80	Canarias	.....
Aragon	0.90	Ceuta	1.18
Castilla la Vieja	0.23		

Se ve que los distritos más castigados han sido Galicia y Ceuta, y los menos Extremaduras, Baleares, Canarias, Navarra y Andalucía.

Vacunación y revacunación.—Para apreciar detalladamente los resultados de ésta, vamos á dar los resúmenes por armas y distritos del ejército de la Península, cuyos resultados, como se verá, son satisfactorios.

RESUMEN POR ARMAS.

	Número de vacunados.	Resultado.		Número de revacunados.	Resultado.		Totales.	
		Con éxito.	Sin él.		Con éxito.	Sin él.	Con éxito.	Sin él.
Infantería	13,726	11,200	2,567	10,312	6,284	4,028	17,484	6,595
Caballería	3,436	2,670	766	2,770	1,815	955	4,485	1,721
Artillería	1,982	1,654	328	2,100	1,373	727	3,027	1,055
Ingenieros	1,354	1,120	234	907	639	268	1,759	502
Administración	234	165	69	140	80	60	245	129
Sanidad	142	104	38	140	83	57	187	95
Totales	20,915	16,913	4,002	16,369	10,274	6,095	27,187	10,097

RESUMEN POR DISTRITOS.

Castilla la Nueva	6,265	4,882	1,383	1,652	906	746	5,788	2,129
Cataluña	3,782	2,910	872	1,164	584	580	3,494	1,352
Andalucía	436	379	47	2,100	1,850	250	2,229	293
Valencia	191	143	48	2,476	1,649	827	1,792	875
Galicia	1,373	797	576	429	74	355	871	931
Granada	2,610	2,827	283	1,564	794	770	3,121	1,053
Aragón	2,905	2,730	176	1,081	215	866	1,945	1,042
Castilla la Vieja	456	247	209	1,026	669	257	916	569
Extremadura	601	542	59	.....	.....	.....	542	59
Navarra	47	45	2	882	534	348	576	350
Vascongadas	56	51	5	1,953	1,598	355	1,649	360
Burgos	994	789	205	1,701	1,255	446	2,044	651
Baleares	633	633	.....	54	.....	54	633	54
Canarias	52	38	14	9	7	2	45	16
Ceuta	523	400	123	278	139	139	539	262
Totales	20,915	16,913	4,002	16,368	10,274	6,095	27,187	10,097

Pneumonias y pleuro-pneumonias.—Han sido asistidos en los hospitales militares y cívico-militares de la Península: 956 en infantería, 276 en caballería, 101 en artillería, 42 en ingenieros, 13 en administración y 7 en sanidad.

De éstos han fallecido 101 en infantería, 31 en caballería, 10 en artillería y 5 en ingenieros, ó sean 147.

Como en el año anterior fallecieron 169, resulta una diminución muy acentuada á favor del año 1891.

Las proporcionalidades de muertos por distritos ha sido la siguiente:

Distritos.	Muertos.	Distritos.	Muertos.
Castilla la Nueva	2.41	Extremadura	3.71
Cataluña	5.28	Navarra	2.93
Andalucía	0.81	Vascongadas	1.21
Valencia	1.36	Burgos	13.50
Galicia	1.41	Baleares	
Granada	2.60	Canarias	0.88
Aragón	1 44	Ceuta	1.18
Castilla la Vieja	3.30		

Se ve que el distrito más castigado ha sido Burgos, donde se ha triplicado la mortalidad con respecto á los de mayores cifras mortuorias.

La proporcionalidad comparada, por armas, ha sido la siguiente:

Armas.	1890.	1891.	Armas.	1890.	1891.
Infantería	2.01	1.87	Ingenieros	2.17	1.10
Caballería	2.74	2.54	Administración	1.16	
Artillería	2.20	1.17	Sanidad	1.95	

Se ve que el arma más castigada ha sido caballería, y las menos administración y sanidad.

Inútiles.—Han sido declarados 1,647 en infantería, 292 en caballería, 223 en artillería, 124 en ingenieros, 18 en administración y 11 en sanidad. Total, 2,315.

La proporcionalidad por armas, ha sido la siguiente:

Infantería	30.32	Ingenieros	27.35
Caballería	23.95	Administración	19.50
Artillería	26.17	Sanidad	22.40

Como se ve, el arma más castigada ha sido infantería, y la menos administración.

Examinando el número de individuos imputables y no imputables al ministerio de la guerra, nos encontramas con las siguientes cifras:

Distritos.	Fuerza imputable.	Fuerza no imputable.	Distritos.	Fuerza imputable.	Fuerza no imputable.
Castilla la Nueva	456	28	Aragón	129	6
Cataluña	281	94	Vascongadas	182	6
Andalucía	295	64	Navarra	94	2
Valencia	212	111	Granada	182	15
Burgos	195	26	Galicia	75	31
Castilla la Vieja	138	2	Baleares	16	5
Extremadura	29	1	Canarias	23	

Las enfermedades que mayor número de inútiles han proporcionado, han sido las siguientes:

Enfermedades.	Infantería.	Caballería.	Artillería.	Ingenieros.	Admón.	Sanidad.
Hernias	252	42	34	12	3	2
Tuberculosis pulmonar	246	55	42	23	4	1
Hegm.sias apart. resp.o	161	39	28	29	3	4
Debilidad general	89	23	13	8	3	1
Lesión org. corazón	91	9	10	6		2
Tiña	50	9	7	6		

Traumatismos.—Han tenido ingreso en los hospitales militares y cívico-militares á consecuencia de herida por agresión ó por accidente, 287 heridos de infantería, 151 de caballería, 114 de artillería, 48 de ingenieros y 9 de administración. Total, 609.

De éstos han fallecido 5 en infantería, 2 en caballería, 2 en artillería. Total 9.

Han sido declarados inútiles 7 de infantería, 3 de caballería, 3 de artillería y 1 en ingenieros. Total, 14; el resto han curado.

Licencias temporales.—Con objeto de convalecer de diferentes enfermedades, se han concedido las siguientes licencias en el ejército de la Península:

Infantería, 1,199; caballería, 313; artillería, 307; ingenieros, 157; administración, 36; sanidad, 26. Total, 2,038.

Las principales enfermedades por las cuales se han concedido licencia, han sido las siguientes:

Enfermedades.	Infantería.	Caballería.	Artillería.	Ingenieros.	Admón.	Sanidad.
Anemia	113	24	24	7	3	1
Bronquitis	69	47	55	19	1	1
Catarro pulmonar	150	26	34	17	5	3
Fiebres intermitentes	97	20	20	12	3	3
Fiebres tifoideas	73	28	10	7	1	.....
Pneumonías	152	48	30	16	4	5
Reumatismo	100	20	38	16	1	3
Sarampión	77	10	7	3	.....	.....
Viruelas	88	16	28	11	4	1

Suicidios y cadáveres en depósito.—Ha habido 5 suicidios en infantería producidos por disparo de arma de fuego, y se han admitido 12 cadáveres en depósito pertenecientes: á infantería 9, á caballería 2, y á artillería 1.

Isla de Cuba.

El término medio de la fuerza en revista en esta Antilla, ha sido 12,857 hombres en infantería, 1,828 en caballería, 941 en artillería, 753 en ingenieros, 130 en sanidad y 4,232 en guardia civil, que es fuerza imputable, ó sea en total 20,744 hombres.

Fallecidos.—De éstos han sucumbido 378 en infantería, 42 en caballería, 40 en artillería, 17 en ingenieros, 3 en sanidad y 59 en guardia civil, que dan un total de 539.

Como en el año 1890 solamente fallecieron 363, resulta considerablemente aumentada la mortalidad en el de 1891, pues mientras en el primero fué de 16.47 por cada 1,000 hombres de fuerza en revista, en 1891 ascendió á 25.98 por 1,000 sanos. Esto se ha debido al considerable aumento que en el año que venimos reseñando ha tenido la necrologia por *fiebre amarilla*, según vamos á ver immediatamente.

	Fallecidos de fiebre amarilla.			Fallecidos de fiebre amarilla.	
	Año 1890.	Año 1891.		Año 1890.	Año 1891.
Infantería	131	299	Sanidad	3	.....
Caballería	13	23	Guardia civil	29	32
Artillería	25	30			
Ingenieros	30	13	Totales	231	397

Así es, que mientras en el año 1890 fallecieron de esta sola enfermedad el 10.48 por 1,000 sanos, ascendió en 1891 al 19.13 por idéntica cifra de fuerza en revista. Solo en el Hospital Militar de la Habana se asistieron de tan cruel dolencia durante el citado año, 881 individuos de tropa, de los que fallecieron 222, produciendo una mortalidad de 250.14 por 1,000 asistidos, cifra como se ve desconsoladora por lo alta.

Fiebres tifoideas.—Se asistieron de esta enfermedad 31 hombres en infantería, 9 en caballería, 1 en artillería, 2 ingenieros y 1 guardia civil, total 44. De éstos falle-

cieron 9 en infantería, 4 en caballería y 2 en ingenieros; es decir, 15, siendo por tanto las proporcionalidades por cada 1,000 sanos de 0.70 en infantería, 2.18 en caballería y 2.56 en ingenieros.

Tuberculosis pulmonar.—Hubo que lamentar la pérdida de 23 muertos en infantería por 47 asistidos, 1 muerto en caballería por 6 asistidos, 1 en artillería de 3 ingresados, 1 en ingenieros por 5 ingresados, 1 en sanidad por 3 ingresados y 6 de guardia civil de 12 entrados, es decir 33 muertos en total, además de 10 inútiles que se declararon de esta cruel afección y de 25 licencias que se concedieron por la misma. Las proporcionalidades de fallecidos por cada 1,000 hombres de fuerza en revista, fueron como sigue: 1.78 en infantería, 0.54 en caballería, 1.06 en artillería, 1.32 en ingenieros, 7.70 sanidad y 1.40 guardia civil, llamando la atención la alta cifra necrológica que correspondió á sanidad.

Paludismo.—Se asistieron de malaria 396 individuos de infantería, 56 de caballería, 38 de ingenieros y 58 de guardia civil; total 604. Como en 1890 se asistieron 1,558 y en 1889 hubo 2,054 ingresados en los hospitales por esta enfermedad, se nota una importantísima disminución de entrados en hospitales, que gustosísimos consignamos.

Los fallecimientos por la misma ascendieron á 15 en infantería, 4 en caballería, 2 en artillería y 6 en guardia civil, ó sean, 27 en total, lo que da una proporcionalidad de 1.16 por infantería, 2.18 por caballería, 2.12 por artillería y 1.41 por guardia civil.

Venéreo.—Hubo 669 asistidos en infantería, 74 en caballería, 53 en artillería, 51 en ingenieros y 83 en guardia civil, total 928. Todos curaron.

Sífilis.—Ingresaron 36 individuos en infantería, 2 en caballería, 1 en artillería, 3 en ingenieros y 14 en guardia civil, total 56; no hubo ningún inútil ni fallecido.

Pneumonía.—Se asistieron 19 en infantería, 1 en caballería, 2 en artillería y 1 en guardia civil, total 23. De éstos fallecieron 2 individuos de infantería 1 de artillería, siendo por tanto las proporcionalidades necrológicas de 0.15 por la infantería y 2.12 por la artillería.

Viruelas.—Hubo 1 muerto en artillería y 1 en guardia civil, lo que da la proporcionalidad de 1.06 por la primera arma y de 0.23 por la segunda. Resulta halagüeño para la estadística cubana tan exígua cifra necrológica por esta repugnante enfermedad en ejército de más de 20,000 soldados, siendo más afortunado éste que el de la Península, donde de 80,000 hombres de fuerza en revista, han fallecido 27, es decir, más del triple que en Cuba.

Inútiles.—Se han declarado 47 en infantería, 3 en caballería, 8 en artillería, 6 en ingenieros, 1 en sanidad y 12 en guardia civil, total 77. De éstos lo fueron la mayoría por tuberculosis, hernias, afecciones crónicas del aparato respiratorio, hipertrofia cardiaca, et cétera. Las proporcionalidades fueron las siguientes:

Infantería	3.65
Caballería	1.64
Artillería	8.50
Ingenieros	7.96
Sanidad	7.68
Guardia civil	2.83

Traumatismos.—Tanto por agresión como por accidente, hubo 63 heridos en infantería, 22 en caballería, 18 en artillería, 8 en ingenieros, 1 en sanidad y 13 en guardia civil, total 125. De éstos fallecieron: 1 en infantería, 4 en caballería, 1 en artillería y 1 en ingenieros, total 7. Hubo 3 inútiles en infantería, curaron el resto.

Regresados por enfermos á la Península.—Se embarcaron para España 147 en infantería, 35 en caballería, 28 en artillería, 48 en ingenieros, 2 en sanidad y 16 en guardia civil; total, 276. Las enfermedades que produjeron su baja en Cuba, fueron la cloroanemia, en 184 casos; la gastralgia, en 44; la tuberculosis, en 25; regresando el resto por padecer catarros, hepatalgias, infartos, etc.

ISLA DE PUERTO RICO.

Fuerza en revista.—El término medio en esta Antilla, fué de 2,196 soldados en Infantería, 7 en caballería, 470 en artillería, 25 en sanidad y 639 en guardia civil; total, 4,337. De éstos fallecieron 21 en infantería, 10 en artillería y 3 en guardia civil; total, 34. Como en el año 1890 murieron 101, resulta la mortalidad disminuida en *dos tercios* en el 1891. Así, mientras el tanto por 1,000 de fallecidos, fué en el primer año de 28.07, en el que venimos reseñando sólo fué de 9.69, cifra altamente ventajosa, tratándose de un país tropical.

Fiebre amarilla.—Fallecieron de esta cruel dolencia 7 individuos de infantería, 5 de artillería y 2 de guardia civil; total, 14. Lo que da una proporcionalidad de 4.57 por 1,000 sanos. El año de 1890 fallecieron de esta sóla enfermedad 74 individuos imputables á guerra, ascendiendo la proporcionalidad de dicho año á 20.77 contra 4.57 en el año de 1891. El resultado es consolador en alto grado por el año actual, y lo consignamos con el mayor gusto.

Fiebres tifoideas.—Uno asistido en infantería que murió. La proporcionalidad fué, pues, de 0.45 por 1,000 sanos.

Tuberculosis pulmunar.—Doce asistidos en infantería, 6 en artillería, 6 en guardia civil y 1 en sanidad; total, 25. De estos fallecieron 1 en infantería y 2 en artillería; total, 3. Se dieron por útiles 11, y 10 con licencia temporal. La proporcionalidad de muertos fué de 0.45 en infantería y 4.25 en artillería.

Paludismo.—Hubo 241 asistidos en infantería, 67 en artillería y 95 en guardia civil; total, 403. De éstos fallecieron 5 en infantería, curando el sexto. Las proporcionalidades fueron, pues, de 2.27 por 1,000 en Infantería.

Pneumonias.—Hubo 2 asistidos en infantería, de los que murió 1, y 1 en artillería, que falleció; total, 3. Las proporciones fueron, pues, de 0.45 por infantería y 2.50 por 1,000 sanos por Artillería.

Venéreo y sífilis.—Se asistieron 184 imputables á guerra que curaron todos. En sífilis ingresaron 50 que también curaron.

Viruela.—No hubo ningún fallecido de esta cruel afección.

Inútiles.—Hubo 29 en infantería, 4 en artillería y 1 en guardia civil, total, 34. Siendo las proporcionalidades de 13.23 por infantería, 8.50 por artillería y 1.56 por la guardia civil. Las enfermedades que dieron más inútiles fueron la tuberculosis, lesión orgánica de corazón y palpitaciones del mismo.

Traumatismos.—Hubo 6 heridos en infantería y 4 en artillería; total, 10. Todos curaron.

Pases á España por enfermos.—Regresaron por este concepto 23 individuos de infantería, 6 en artillería, 12 en guardia civil y 4 en sanidad; total, 45. Las enfermedades que produjeron sus regresos fueron principalmente la cloro-anemia, la tuberculosis, la debilidad general, los infartos viscerales y el catarro intestinal.

ISLAS FILIPINAS.

El término medio de la fuerza en revista en el Archipiélago ha sido de 2,271 europeos y de 10,750 indígenas de la fuerza imputable á guerra, toda vez que el resto hasta las cifras consignadas en los estados generales es de organismos no imputables al ministerio de la guerra.

De esta fuerza han fallecido 8 europeos y 233 indígenas en infantería, 1 europeo y 5 indígenas en caballería, 59 europeos en artillería, 1 europeo y 2 indíginas en ingenieros, 16 indígenas en guardia civil y 8 indígenas en guardia veterana, ó sean, en total, 69 europeos y 264 indígenas.

Las proporcionalidades de fallecidos han sido para los europeos 30.38 y para los indígenas 24.55. Como el año 1890 fueron de 555, para los europeos y 9.81 para los indígenas, resultan muy elevadas las proporcionalidades en el año actual. Esto se debe, en primer término, á las fiebres perniciosas que han ocasionado 20 muertos europeos y 76 indígenas, y á la disentería que ha arrebatado 7 europeos y 51 indígenas.

Fiebres tifoideas.—Se han asistido 21 europeos y 23 indígenas, de los cuales han fallecido 14 europeos y 22 indígenas.

Las proporcionalidades de fallecidos han sido para infantería de 0.36 europeos y 0.28 para los indígenas; para la artillería de 2.00 europeos y 0.00 para los indígenas; para los ingenieros de 2.35 en los europeos y 0.22 para los indígenas, y para la guardia civil 0 europeos y 0.30 indígenas.

Tuberculosis pulmonar.—Hubo 12 europeos asistidos y 76 indígenas; de éstos murieron 4 europeos y 31 indígenas, y se declararon inútiles 6 europeos y 39 indígenas, en infantería y se declararon inútiles 6 europeos y 39 indígenas.

Las proporcionalidades de fallecidos fueron las siguientes: 0.29 en infantería, indígenas; 0.22 en artillería, europeos; y 0.22 indígenas de guardia civil.

En inútiles hubo las siguientes proporcionalidades: 0.39 indígenas en infantería; 0.13 europeos en artillería; 0.67 indígenas en ingenieros y 0.18 guardia civil.

Paludismo.—Hubo 67 europeos ingresados de paludismo y 2,657 indígenas: de éstos han fallecido 20 europeos y 76 indígenas.

Se han concedido 427 licencias indígenas, y han regresado á España 12 europeos.

La proporcionalidad de fallecidos ha sido: 0.36 europeos y 0.98 indígenas en infantería; 1.00 en artillería y 0.13 en guardia civil.

Venereo.—Se han asistido 119 europeos y 52 indígenas; no ha habido ningún muerto ni inútil.

Sífilis.—Se han asistido 7 europeos y 27 indígenas imputables á guerra; se han concedido 4 licencias, curando el resto.

Pneumonias.—No ha habido ningún ingresado.

Viruela.—Han fallecido de esta cruel enfermedad 3 europeos y 9 indígenas, lo que da una proporcionalidad de 1.31 para los europeos y 0.83 para los indígenas.

Inútiles.—Han sido declarados inútiles 1 europeo y 166 indígenas en infantería, 6 indígenas en caballería, 26 europeos en artillería, 6 indígenas en ingenieros, 2 indígenas en sanidad, 17 indígenas en guardia civil y 1 indígena en guardia veterana, lo que da un total de 27 europeos y 198 indígenas.

La proporcionalidad de inútiles por razas fué de 11.67 europeos y 17.50 indígenas.

Las enfermedades que mayor número de inutilidades causaron fueron la debilidad general, las hernias, las palpitaciones de corazón y la tuberculosis pulmonar. De la primera se inutilizaron 3 europeos y 51 indígenas, de la segunda 2 europeos y 4 indígenas, de la tercera 1 europeo y 11 indígenas y de la cuarta 6 europeos y 39 indígenas.

Traumatismos.—Ingresaron en hospitales 67 heridos en infantería, 8 en caballería, 27 en artillería, 4 en ingenieros, 3 en carabineros y 6 en guardia civil; total, 115. De éstos fallecieron 2 en infantería, 1 en artillería. Además se declararon inútiles, 3 en infantería, 1 en guardia civil, 1 en carabineros y 1 en ingenieros. Finalmente, en varias acciones de guerra, fallecieron 5 en infantería, 2 en artillería y 7 de fuerza no imputable á guerra; total, 14.

Pases á la Península por enfermos.—Regresaron por este concepta á España 60 en infantería, 5 en caballería, 261 en artillería, 7 en ingenieros y 3 en guardia civil; total, 336.

Las enfermedades que les obligaron principalmente á regresar á la Península fueron en 280 casos la anemia, en 11 el catarro intestinal, en 12 el paludismo, y en 9 las palpitaciones del corazón.

OJEADA RETROSPECTIVA SOBRE LA ORGANIZACIÓN DE LA SANIDAD EN LOS EJÉRCITOS ESPAÑOLES. PRIMEROS ALBORES DE LA MEDICINA MILITAR EN AMÉRICA.

Por Dr. Felix Estrada Cotoyra,

Capitan Cirujano del Ejército Español.

No es posible separar la historia de la medicina militar de la de los ejércitos en campaña, por lo que hace á nuestra patria, pues doquiera acudieron las tropas españolas, fueron acompañadas de *físicos y cirujanos*, que en medio de las batallas, en los rigores del combate, restañaron la sangre de los heridos, curaron las enfermedades de los combatientes, sufriendo las penalidades del soldado, participando de todas las calamidades de la guerra. Y no sólo ha pasado así desde el invento de la pólvora, desde la aplicación de la artillería, sino desde los primitivos tiempos de nuestra historia, como es fácil comprobar por la lectura de los códices más antiguos.

No es extraño que así sucediere si tenemos en cuenta que la medicina vulneraria ha sido una de las primeras conquistas hechas á la naturaleza en las primeras edades del mundo, como dice un elegante escritor que tuvimos por maestro.*

"Allí en donde por primera vez luchó el hombre de un modo material," dice un hitoriador de nuestros dias, "por defender su derecho, ó por dar amplitud á sus deseos y aspiraciones, y hasta satisfacción á sus vicios y malos pensamientos, allí empezó la medicina militar. Primero la lucha, despues el modo de remediar sus estragos, esto es lógico; en todos los países ha tenido que suceder así y por consiguiente en nuestra España.†

Recorramos la Iliada y la Odisea, que podemos considerar como primitivos anales de la ciencia médica, y allí veremos al hijo de Apolo, al gran Esculapio, descendiendo á la tierra para enseñar á los mortales el arte de curar y evitar la fria segur de las inflexibles Parcas. Tambien Homero canta en inmortales versos el valor de Podaliso y Chiron y de otros príncipes que en los campos de batalla, alcanzan gran renombre no sólo por sus heroicos combates, sino tambien por la habilidad que muestran en restañar la sangre de los heridos.

Probado está por las investigaciones de literatos y médicos que los ejércitos griegos y romanos contaban con médicos y cirujanos que los acompañaban en las guerras. Simpson,‡ Kühn§ y Aubertin‖ han demostrado la existencia demé dicos militares en las legiones egipcias, griegas y romanas y en todos los ejércitos de la antigüedad. Nuestra patria, teatro de grandes acontecimientos militares desde los primeros conquistadores, centro de luchas y discordias intestinas al constituirse la monarquía goda; en combate con los árabes durante algunos cientos de años para reconquistar el territorio; fué sin duda una de las naciones en que más predominó el espíritu guerrero; en que más necesarios se hicieron los servicios humanitarios para asistir á los combatientes heridos en las frecuentes luchas; así no es extraño que los servicios médico-castrenses tengan en nosotros un orígen más antiguo que en los demás pueblos de Europa, y así también que durante muchos años España marchase á la cabeza en lo que se refiere á la organización sanitaria de los ejércitos.

En casi toda la edad media, así en España como en otros países, la medicina era estudiada y practicada muy especialmente por los judios, tan numerosos en los países cristianos y muy particularmente en el nuestro, cuanto que las leyes que contra ellos promulgaron varias veces los reyes godos posteriores á Recaredo, eran inspiradas por el miedo que hubo de que llegaren á formar de España un estado judai o,

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* Vicisitudes y progresos de la medicina como ciencia y arte en relación con los demas conocimientos. Discurso del catedrático de patología quirrúgica de Santiago, D. Ramon Otero.

† Historia de la Medicina Militar Española, por D. Antonio Poblacion.

‡ Was the Roman army provided with any medical officers? By T. Y. Simpson, President of the Royal College of Edinburg, 1851.

§ De Medecine militaris apud veteres Græcos Romanesque conditione, D. Carolus Kühn, etc., 1824–1827 Dissertations.

‖ "Del servicio militar en los ejércitos de la antigüedad," por Ch. Aubertin.

atribuyéndoseles también gran participación en la conquista árabe. El Fuero Tuzgo contiene leyes especialmente aplicables y referentes á los médicos judios; por cierto bien crueles y absurdas, pues entre estos hubo verdaderos sabios que hicieron progresar la medicina, como el famoso Izchag, médico del Rey D. Alonso VII. de Castilla, y otros muchos que cita Hernandez Morejon como hábiles cirujanos que contribuyeron al adelanto de la medicina patria.

El establecimiento de hospitales en España es también de remotos tiempos, y aunque faltan datos anteriores al siglo 12, no sería difícil encontrar noticias aisladas no tanto en las crónicas (que estas eran demasiado secas y concisas en los principios de la edad media), pero si en los archivos monacales y otros de villas, ciudades é iglesias del reino, en que se habla de fundaciones de hospitales por nuestros reyes, en particular para leprosos, desde los primeros tiempos de la monarquía asturiana, pudiendo decir otro tanto de los demás Estados en que se dividía la península.

Consta sí, que en el siglo 12 existían hospitales para curar los heridos de la guerra, siendo fundado uno en Toledo por D. Pedro Fernandez de Fuentecalada, maestre de la orden de Santiago. En el castillo de Guadalherza lo estableció la orden de Calatrava; y otros varios citan los historiadores en distintos pueblos de la península, demostrándose que esta institución sanitaria para los ejércitos es más antigua entre nosotros que en otras naciones. Quizás la influencia que la dominación romana ejerció en España fuese la causa de existir hospitales para la tropa en nuestro suelo desde tan antiguo, pues sabemos por Higinio el Agrimensor que los romanos en sus campos de guerra establecían el valetudinarium ó enfermería para sus soldados.

Las órdenes militares tuvieron gran influencia en la creación de hospitales, así como las instituciones derivadas de ellas para la asistencia de enfermos y peregrinos; no dejando de tener una gran participación en estas fundaciones las expediciones de los caballeros castellanos, arragoneses y navarros al Egipto y Palestina formando parte de las cruzadas en la conquista de Jerusalem.

Pero no vamos á seguir en este orden de ideas, y volvamos á la fundación de verdaderos establecimientos dedicados á la hospitalidad de nuestras tropas.

Los primeros hospitales de campaña organizados en todos sus servicios fueron los establecidos en España por Isabel la Católica. Hernan Perez del Pulgar al escribir sobre la conquista de Granada dice:

E para curar los feridos é los dolientes, la reina enviaba siempre á los reales, seis tiendas grandes é las camas é ropas necesarias para los feridos y enfermos, y enviaba físicos é cirujanos é medicinas, homes que les sirvieren é mandaba que no llevaren precio alguno, porque ella lo mandaba pagar; y estas tiendas, con todo este aparejo, se llamaba en los reales el hospital de la reyna.

Pedro Martin de Angleria, que formaba en el ejército español el año de 1449, escribió desde el sitio de Praga al cardinal Arzobispo de Milán sobre este hospital, elocuentes frases que demuestran deben su origen los hospitales de campaña á la munificencia de la egregia Isabel, á quien tanta gloria debe España y la causa de la civilización.

Pero si existían hospitales en nuestra patria y si la historia nos ilustra respecto á los que para la conquista de Granada estableció la reina católica que podemos considerar como verdaderas ambulancias de campaña; si la legislacion médico-militar la encontramos en las leyes de partida del sabio D. Alonso; si es fácil demostrar que á los ejércitos acompañaban médicos y cirujanos, no es tan fácil comprobar la organización dada á estos para el cumplimiento de sus servicios. No podemos dejar de estar conformes con el historiador médico-militar Población que dice sobre este particular: "Pero es indisputable que los médicos cirujanos, farmacéuticos, practicantes y enfermeros, socorrieron con organización que no podemos determinar los desastres propios de la guerra; que hubo dotación de efectos quirúrgicos y de medicamentos y que el personal fué recompensado más ó menos ampliamente por el dinero particular de la reina Isabel."

Esta falta de datos que encontramos en el servicio de la sanidad militar del

período de la historia patria hasta los reyes católicos corresponde á la vez á la falta de una organización para el ejército que hasta esa fecha no puede considerarse como un verdadero organismo para la defensa del territorio según aquellos monarcas establecieron despues en sus pragmaticas. Así en 1505 vemos aparecer un cirujano en cada una de las compañías de los llamados guardas de Castilla que instituyeron á las hermandades de Castilla organizadas por D. Alfonso.

Al terminar el glorioso reinado de los reyes católicos el ejército estaba necesitado de grandes reformas que acometió el ilustre Cardenal Ximenez de Cisneros, el que al hacerse cargo de la Regencia en 1516 trató de formar un ejército respetable, oyendo la opinión de los militares más distinguidos y conocedores de la guerra; entre ellos del Coronel Rengife. Formáronse los tercios de Lombardia, Nápoles y Sicilia y en plana mayor figura un médico, un cirujano y un boticario.

Mas adelante cuando Felipe II. recojió la herencia grandiosa de su padre, reformó el ejército de Italia y también figuran los médicos y cirujanos, dándose entonces instrucciones para dar de baja á los soldados inútiles con la intervención de los profesores de sanidad.

La historia del cuerpo de sanidad militar marcha unida á la del cuerpo de sanidad de la armada en estos tiempos de primitiva organización. Como auxiliares y al servicio de los reyes y príncipes, vemos indistintamente á los médicos y cirujanos figurando en el ejército y en la marina, siendo fieles compañeros y amigos de los monarcas, como Diego del Villar lo fué de D. Alonso VIII. á quien curó de sus heridas en la desgraciada batalla de Alarcos; como Dionisio Doya Aracon, Luis Lobera de Avila, Antonio de Guevara, y Cistobal Perez de Herrera, que tan brillantes servicios prestaron en las campañas de mar y tierra de su época; como más tarde lo fué Pedro Virgilio que siendo cirujano del Rey Fernando VI. fundó el Colegio de Cirugía Militar de Cádiz y pocos años despues el de Barcelona.

Al intentar bosquejar el origen, organización y servicios de la sanidad militar en Cuba, es preciso remontarnos al descubrimiento de America.

Aunque la flota que condujo al gran navegante en su primer viaje no tenía una organización miltar verdadera, es indudable que aquellas caravelas que señalaron la ruta de los más grandiosos descubrimientos, no iban huérfanas de auxilios médicos; entre aquellos intrépidos y arriesgados españoles, avezados en las luchas, llenos de fé en las palabras del insigne descubridor, no podían faltar algunos maestros en la ciencia de curar. Tanto más debe creerse que así sucediere, cuanto que en aquellos tiempos, debido á nuestras guerras con los moriscos, no faltaban maestros, cirujanos y médicos en la península. La medicina era profesada por muchos, que sin estudios teóricos, obtenian su práctica en los campos de batalla, en las epidemias de los campamentos, en los sitios de las villas y ciudades.

Al génio previsor de Colón que dispuso sus bajeles pertrechándolos para tan largo viaje de exploración, no pudo pasar desapercibida la falta de cirujanos que curasen los heridos que era de pensar tuviere en sus conquistas, que asistiesen las enfermedades de la mar que tan frecuentes eran en las tripulaciones, y de que tan terrible memoria quedó después de otras expediciones como en la de Vasco de Gama, la de Magallanes y otras varias.

Tanto más de presumirse es que llevasen en sus caravelas medios de atender á sus enfermos, cuando Colón fué aconsejado para emprender su viaje por los Padres de la Rabida, á cuyo talento no podían escaparse las necesidades de una empresa tan arriesgada. No es posible fuese desprovista de recursos sanitarios una expedición tan estudiada, cuando la medicina ya había tomado parte en otras anteriores. Por la historia sabemos que en el siglo 13 el cirujano Juan Pirtard acompañó á San Luis á Tierra Santa, y si bien de la época de que hablamos no se sabe como se prestaba la asistencia facultativa en las naves, ni el orígen, modo y forma de los nombramientos, no faltaban á los expedicionarios de mar y tierra los servicios sanitarios.

Tampoco podemos considerar á Colón menos previsor que á su competidor Americo Vespucio que con Alonso de Ojeda y Juan de la Cosa arribaron en 1499 á Vene-

zuela, y que según el historiador Pacheco "en esta expedición iban provisiones de todas especies, harina, legumbres, objetos de farmacia, artillería," etc.

En efecto, corroborando nuestras suposiciones, se sabe que en la "Santa Maria" estaba, en 1492, el Maestro Alonso, físico de Moguer, el que sin duda se alistó voluntariamente para aquella expedición, compuesta en su mayor parte de los valientes hijos del famoso puerto de salida. En la lista de tripulantes de dicha nao figura el tal Alonso después de los pilotos Juan de la Cosa y Sancho Ruiz, lo que confirma su destino de médico de la embarcación, de la misma manera que en nuestros buques forma el oficial de sanidad despues de los oficiales de mar.

Que la primera expedición de Colón no iba huérfana de servicios médicos, es tan seguro, cuanto que entre los 38 hombres que al mando de Rodrigo de Arana dejó el descubridor en el fuerte de Navidad, cuando volvió á España inmediatamente después del descubrimiento, había un Maestro Juan, cirujano, buena persona, dice Gonzalo de Oviedo (Hist. Grl. de Indias, Lib. II., Cap. VI.) al que más adelante se llama hombre de bien, gentil cirujano (Lib. II., Cap. XII.) Herrera también lo refiere en sus decadas (Dec. I., Lib. I.)

Muchas veces omiten los historiadores tales pormenores, pero debe entenderse que en todas aquellas memorables expediciones de los conquistadores españoles llevaban médicos y cirujanos, máxime cuando no olvidaban ni los más insignificantes detalles en otros puntos de menor interés.

Por otra parte, no es posible suponer que aquellos ilustres monarcas de Castilla tan interesados por la salud de sus tropas que organizaron hospitales militares para la conquista de Granada, dejaren marchar sin asistencia facultativa una expedición á la que contribuyeron tan poderosamente para gloria imperecedera de España; y efectivamente en la condición 10ª. de las capitulaciones acordadas y firmadas el 17 de Abril de 1492 entre Fernando é Isabel y Cristobal Colón aparece el acuerdo de que hubiere médicos, siendo el primero que obtuvo real nombramiento el Doctor Diego Alvarez Chanca, en 1493, que era médico de la princesa primogénita Dª. Juana. No consta que este ilustra médico acompañare á Colón en su primer viaje, pero si está probado que le siguió en un segundo viaje á America, escribiendo á su regreso una carta al cabildo de la catedral de Sevilla, en la que describe las costumbres de los habitantes de Santo Domingo según puede verse en las biografías de este médico, así como en la "Coleccion de viages" de Fernandez Navarrete.

Por real orden 6 de Enero de 1501 dada en Sevilla, se previene al Almirante Colón nombrarse los facultativos para su escuadra; así como en otra de 1560 se autorizó al Capitán General del Oceano D. Alvaro de Bayan para expedir los nombramientos de los médicos en los buques de guerra.

Como dijimos anteriormente estaban fundidos en uno los cuerpos de sanidad del ejército y de la armada prestando servicios de mar y tierra ilustrados médicos que acompañaron las expediciones de Colón, Hernan Cortes, Pizarro y demas intrépidos navegantes y conquistadores, por más que la mayoría de los nombres de aquellos profesores han pasado sin dejar rastro en la historia de aquellos sucesos.

Poco sabemos para ilustrar la historia médico-militar de aquellos tiempos, y sí hemos citado el hecho de acompañar á Colon en su primer viaje al físico de Moguer, Maestre Alonso, así como el Maestre Juan, y en el segundo el Dr. Alvarez Chanca ha sido para corroborar nuestras primeras palabras, que doquiera han ido tropas españolas no ha faltado asistencia médica, generosa y humanitaria.

La historia médica de la primera expedición aparece gráficamente pintada en las siguientes frases que Colón estampa en su diario de navegación: "Loado sea nuestro Señor hasta hoy (27 de Noviembre) de toda mi gente no ha habido persona que le haya mal la cabeza ni estado en cama por dolencia, salvo un viejo de dolor de piedra, de que él estaba toda su vida apasionado y luego sanó al cabo de dos días. Esto que digo es de todas las tres naves."

Los historiadores nos dicen también que al regresar Colón á la Española en su segundo viage habia perecido casi toda la guarnición, figurando entre los muertos el

Maestre Juan, y como según los datos que dan historiadores de crédito parece deducirse lógicamente que aquella guarnición del fuerte de Navidad fué diezmada por la fiebre amarilla, podemos considerar que el primer médico que rindió tributo á la endemia americana fué el citado Maestre Juan.

Para terminar conviene no echar al olvido la gran parte que más ó menos directamente tomaron los médicos en el descubrimiento, pues sabido es que el ilustre genovés consultó su grandiosa empresa con el físico florentino Paolo Toscanelli, que le dirijió varias cartas sobre el particular "dando causa en gran parte á que el Almirante emprendiere el viaje con más ánimo," según dice su hijo, D. Fernando.

Cuando Colón propuso á D. Juan de Portugal la expedición que estaba reservada á la corona de Castilla, aquel monarca encomendó el estudio del negocio al Obispo de Ceuta, gran cosmógrafo, y á Maestre Rodrigo, y Maestre Jusepe, médicos judios, á quienes él daba crédito en cosas de descubrimiento y cosmografía. Estos dos médicos de la corte del Rey D. Juan II. tomaron gran parte en la reforma del *astrolabio* sin cuyo instrumento náutico no hubiera podido intentarse atravesar el océano.

Cuando despues de varios años de inútiles pasos cerca del Rey de Portugal, y de la Reina Católica, Colón se aleja descorazonado, con ánimo de proponer el descubrimiento al Rey de Francia, el guardián de la Rábida le detuvo, y celebró junta con el físico Garcia-Hernandez, entendido en cosmografía, y de allí resultó el armamento de las caravelas, siendo el modesto médico de Palos quien decidió al Padre Juan Perez que intercediese con la Reina para llevar á cabo la más grandiosa obra que registra la humanidad.

Mucho se ha hablado y escrito de todos estos acontecimientos en el reciente Centenario. En folletos, libros y conferencias se han discutido todas las personalidades más prominentes que han figurado en aquel grandioso acontecimiento, pero poco se ha glorificado la memoria de aquellos profesores médicos que prestaron su cooperación al gran navegante.

Al hacer sonar hoy sus nombres ante el Congreso Médico Pan-Americano, es mi ánimo recordaros aquellas prominentes figuras de la historia á las que debemos honor todos los médicos de América.

Los maestres Alonso y Juan fueron los primeros médicos que pisaron la tierra americana, y su nombre debe vivir eternamente en la memoria de todos, pues si Colón demostró audacia y valor al atravesar los mares, iba guiado por la fé y el convencimiento de sus ideas; además como hombre de mar no debía amedrarle embarcar en tan frágiles navíos, pero nuestros médicos probaron un valor mayor al partir á la ventura en aquellas caravelas, cuyo modelo habeis contemplado en el lago Michigan.

Rindamos pues un justo homenaje de admiración, no sólo á los maestres Juan y Alonso, compañeros de Colón en su primer viaje, al Dr. Diego Alvarez Chanca, que vino en la segunda expedición, sino al físico Toscanelli, á los médicos judíos Rodrigo y Jusepe, y muy principalmente al médico de Palos, García-Hernandez, pues quizás si su consejo no prevaleciere, aún estarían ignorados estos continentes, y no existiría la civilización americana, que con asombro contempla hoy todo el mundo.

The executive president having resumed the chair, the following paper was read:

THE WOUNDS OF THE MANNLICHER RIFLE IN THE RECENT CIVIL WAR IN CHILE.

By Augustin M. Fernandez Ybarra, A. B., M. D., New York City.

After the battles of Concon and La Placilla, between the army that supported President Balmaceda and that of the Congresistas, the majority of all the wounded (about 4,000 men) were sent to St. Augustine Hospital, in Valparaiso. In those two engagements half of the soldiers composing the infantry regiments of the Con-

gresistas were armed with the Mannlicher magazine rifle, improved, and the other half with either the Winchester, the Comblain, or the Gras rifle. The Balmaceda infantry had only these last two kinds of weapons, and therefore it was easy to make a good comparison between the wounds caused by the Austrian improved magazine rifle and the two other kinds of guns.

I can not go into the details of the comparison, but the general conclusions are:

(*1*) *As to the orifices of the wounds.*—It is impossible to distinguish, in the great majority of cases, the place of entrance from the place of exit of the projectile, for the wound is clean-cut all the way through the bone. If the bullet strikes a long bone, it passes through without splintering. The bullet is of a very small caliber and nickel-plated, so that the wound is as aseptic as it can possibly be. Besides, its little weight enables the soldier to carry with him nearly twice the number of cartridges.

(*2*) *As to hemorrhage.*—One of the great advantages of the small caliber of the bullet is that it produces little hemorrhage, the point of entrance closing very easily by itself, or, better said, collapsing.

(*3*) *As to complications and repair.*—On account of the great velocity of the projectile, its small caliber, and smooth and polished surface, very little complication takes place, and the repair is very rapid.

These three general conclusions can be condensed in one, viz, that the Mannlicher improved magazine rifle puts out of battle a greater number of men, with less severe wounds, than the other modern magazine rifles.

Among the more important surgical operations performed at the St. Augustine Hospital I will mention 3 disarticulations of the hip joint, with 2 deaths following secondary amputation, performed according to Verneuil's method; the successful case being that of a primary amputation by Esmarch's method. Five resections of the head of the femur (one of these was done by periosteal flaps according to Ollier's method), 3 of them resulting successfully and 2 in death caused by hospital gangrene. Four resections of the knee, all fatal, in one of which death followed the consecutive amputation of the femur, hospital gangrene being the cause of the unsuccessful termination. Two disarticulations of the shoulder, both successful. Fourteen resections of the head of the humerus, all with good result. Two resections of the elbow according to Ollier's method, both successful. Total, 5 disarticulations with 2 deaths, and 25 resections with 6 deaths.

Hospital gangrene developed only in ward No. 2 of the St. Augustine Hospital, where there were 32 wounded soldiers, 16 of them being attacked by the nosocomial infection.

It is remarkable that not even a single case of erysipelas nor of tetanus occurred among the large number of wounded men taken to the Valparaiso hospital.

The following paper was then read, during which specimen bullets were submitted for the inspection of the members of the section.

RICOCHET BULLETS.

By CAPT. CHAS. E. WOODRUFF,

Assistant-Surgeon, U. S. Army.

Though a bullet is apt to go straight through the soft tissues, it occasionally pursues a devious course that is difficult or impossible to follow up. This course is sometimes so erratic as to baffle the ordinary explanations. Some of these cases are undoubtedly due to the fact that the bullet has encountered some hard substance and been deflected like the ordinary ricochet bullet found on our target ranges. A study of a few points as to ricochet bullets may therefore be of some value in locating the bullet that has lodged after traversing the tissues in a peculiar course.

The old leaden bullets suffer very considerable changes of shape as a result of impact, and it is quite possible that the peculiar shapes assumed may assist in

clearing up some of the above cases—not always of course, because bullets recovered after having made a very erratic course through the tissues may show little or no alteration in shape.

The injury to the soft parts is sometimes confined to a very small area around the track of the bullet, and again it may involve large masses of tissues and cause great sloughing if the patient is not killed outright, though the greater amounts of destruction are undoubtedly due to the great velocity and weight of the projectile. A smaller factor may be found in the jagged and odd shapes assumed by the bullet after encountering a hard substance. In order to show these shapes, I have collected a number of ricochet bullets from the rifle ranges at Fort Assinniboine, Mont., and though they may give us little practical knowledge of importance, they may at least be of passing interest to the military surgeon. The new hardened bullets may not assume the shapes found here, but that fact should not lead us to ignore the soft leaden bullet, which will still be used in warfare for a long time to come.

When a man is wounded in battle there are no means of determining whether the bullet that did the damage has not ricocheted from the ground or whether his body was the first object it encountered after leaving the rifle. Consequently, we may have had a much larger percentage of wounds by ricochet bullets than we have supposed. On account of the flatness of the trajectory of the bullets fired from the new rifle, we may have an increase of this class of injuries in future wars.

If the bullet's course through the air is flat enough, it will ricochet from the ground exactly like a flat stone skimmed across the surface of the water. Indeed, a large shell from a 10-inch gun will ricochet even on the water many times before it finally sinks.

It is said that on soft ground a bullet will not ricochet unless the angle of fall is less than 15°. On hard substances it will ricochet at any angle. For the Springfield rifle, with 500-grain bullet and 70 grains of powder, the angle of fall is less than 15° for all ranges short of 2,000 yards. Fig. —.

Beyond this range the bullet will not ricochet, but sinks into the ground. The angle of fall rapidly increases beyond 2,000 yards, so that at 3,500 yards it is about 65°. With long ranges and high trajectories the bullet sustains almost an end on impact. At these ranges the final velocity is so much reduced by the friction of the air that the bullet can scarcely bury itself in the ground; it is often found directly on the surface.

The number of times a bullet will ricochet depends upon the velocity and course after the first impact. As a usual thing the bullet from the Springfield rifle is so reduced in velocity by the first impact that it has not sufficient speed to ricochet a second time. It simply drops dead, and the specimens usually show but one surface made by the impact. It can be mathematically shown that the flatter the trajectory the less is the velocity reduced by the first impact, and that the higher the trajectory, the more will the velocity be reduced. The shorter the range, therefore, the more apt is the bullet to retain sufficient velocity to ricochet two or more times. After the first ricochet the bullet rises at an angle approximately twice as great as the angle of fall. See Fig. —.

Consequently, if the first angle of fall is over 7°, we can not have a second ricochet, because the angle of rise will be 14° and the next angle of fall much larger

than 15°. An angle of fall of 7° corresponds to about 1,500 yards, within which it is possible to have bullets ricochet more than once. At short ranges there is a possibility of still more rebounds, and a few bullets show evidence of three ricochets. Theoretically, at 200 yards, with an angle of fall of $\frac{1}{2}$°, it would be possible to have 4 ricochets, if the velocity were not materially reduced by the friction of the impact.

It is possible merely to approximate the length of leap made by a ricochet bullet. If the velocity were not reduced by the friction, it would follow a trajectory corresponding to the new angle of rise and the velocity it had before impact. For instance, at 200 yards it rises at an angle of 1° and a velocity of 1,000 feet, and this would not carry it more than 300 or 400 yards. At long ranges the leaps will be short but high, because the velocity is so much reduced; at short ranges they will be long, but with flat trajectories.

On falling ground the angle of fall is diminished, of course, and the ricochet made more marked. On rising ground the angle is increased and may prevent ricochets. Troops firing up hill will suffer from more wounds of ricochet bullets than their enemies.

With the new rifle, with greater velocity and flatter trajectory, all the above effects will be intensified and the danger space vastly increased. This has a direct bearing upon the question of how near to the troops in action it will be possible to go with relief.

The bullet being soft and malleable is pounded and twisted into all conceivable shapes by its impact with hard substances. If the surface is very hard, like rock, it will scrape off considerable lead and twist the remainder. The bullet is not heated up very much by the friction or by the change of its energy of motion into the form of heat. Its total energy in foot pounds, when it leaves the gun, is sufficient, when converted into heat, to melt but a tiny amount of lead. Consequently, none of those shapes can be accounted for by the melting of the bullet.

The forms actually assumed can be fairly well accounted for by following the course and motions of the bullet in the air. In accordance with the law that a rapidly-rotating body preserves its plane of rotation, the bullet strikes the ground in the position in which it left the gun barrel, as seen in Fig. —.

We would therefore expect that the rear end of the bullet would be rubbed off or melted off at the first rebound, and so we do find it, as seen in the fifth series. The longer the range the higher must be the elevation, and the more posterior will be the erosion. The shorter the range the more nearly horizontal will the bullet be, and the erosion will approach the point as seen in series 2, 3, and 4. The amount of erosion also depends upon the range, for at long distances the bullet has lost so much of its velocity as to be incapable of much change. At shorter and shorter ranges, it has more and more of its original velocity, and it wears off more and more, until in some specimens the first impact has left scarcely anything but the point. If the trajectory is very flat, the first impact may cause scarcely any change.

The above supposes that the point of impact is in a horizontal plane; but this can not always be the case. The bullet may strike a hillock, or the inclined surface of a rock. Fig. —.

We have then another series in which the erosion began at the point, and more and more of the lead removed until nothing is left in some cases but the base. Beyond this there are the end-on impacts, which "set up" the point more and more, as seen in series 1.

If the bullet strikes the obstacle at the side, it may be ricocheted not in a vertical plane but horizontally. Men behind cover are thus struck from the side. Bullets have been known to be thus deflected as much as 90°.

We have so far taken no note of the alterations in these shapes made by the rapid rotation of the bullet on its long axis. This is very rapid, being 800 to 1,000 or more per second. Its effect depends upon the range, because the forward velocity is rapidly diminished as the bullet progresses, while the rotary motion keeps up almost unimpaired, as there is but little to retard it. Like a spinning top, its rotation will last a long time. At short ranges the erosion takes place so rapidly that the rotation seems to have no time to make any effect. The scratches on the denuded surface are longitudinal and the surface flat. As the velocity diminishes, the rotary motion probably has some effect, because we see the scratches assuming a more and more oblique direction, until in some cases they are almost transverse. There is no relation between the amount of erosion and the direction of these scratches, because it is quite possible for the bullet at short ranges to be little or much eroded, according to the objects it strikes.

The most important result following from the erosion due to the rotation is in the shape of the eroded surfaces. In some cases this assumes a transverse convexity (series 3 and 4), while in others the surfaces are actually corkscrew shape, as seen in series 7, and it can be well assumed that such a form will bore its way through the soft parts in a most eccentric manner. When the erosion is very great there is left a flat, sharp missile that is easily bent into any shape. In series 8 they are bent with a longitudinal convexity, and such a form will surely describe a curve through tissues.

Much interest attaches to the irregular shapes found in series 9 and 10. The former are ricochets that have becomed twisted and bent into odd forms by contact with gravel and other hard substances on the ground. The latter were picked out of the target butt, and owe their shapes to impart with iron bolts, wood, etc. The straight ones were picked out of wood. These irregular shapes may strike the body, and if they are rotating rapidly they will tear around, creating sad havoc.

The amount of damage done by the smaller missiles here shown would necessarily be light, because they possible lose most of their velocity by the friction of the first impact, and their range can not excede 100 or 200 yards, or even much less. Their lessened weight and lessened velocity would render them comparatively as harmless as small birdshot at equal ranges. Still they may be going quite rapidly, for some of the specimens show as much change as a result of the second rebound as of the first.

It is quite possible that the first impact with the ground will cause the bullet to "tumble"—that is, rotate around a transverse axis. This causes the peculiar singing sound of ricochet bullets. This extra rotation would increase the damage done to the tissues.

It is to be remembered that these shapes can be exactly produced by impact of the bullet with hard articles on the soldier's equipment. Metal breastplates, buckles, even the gun in his hand or the cartridges in his belt, or metal articles in his pockets, such as penknives, coins—all of them may be capable of producing these forms. Some of these shapes are produced by impact with bone.

All the ricochet bullets possess a still further interest from a statement that has been attributed to Prof. Finckler, of Bonn, Germany. It is known that certain battles have been followed by large numbers of cases of tetanus among the injured. Prof. Finckler accuses the ricochet bullets of being the instruments of the infection. They have picked up the soil in which the germs have resided and transported them

to the wound. Of course this is supposed to occur in thickly settled countries, where the bacillus seems to be more prevalent among manure heaps, etc. Some of the specimens have soil attached to them, just as they were picked up.

COMMUNICATION D'UN CAS D'ÉLÉPHANTIASIS DU SCROTUM AMÉLIORÉ PAR DES INJECTIONS PARENCHYMATEUSES DE SOLUTION D'ERGOTINE.

Par le Dr. AUG. COMEAU.

Ancien médecin en chef de l'hôpital militaire de Tacmel, médecin de l'arrondissement de Léogane, et médecin du port de Petit Goave (Haïti).

Monsieur le Président et Honorés Confrères: Parmi les cas nombreux de maladies que j'ai observés dans mon service à l'hôpital militaire de Tacmel, je me fais le devoir de vous communiquer un cas d'éléphantiasis de la verge et du scrotum, dont la guérison était très avancée par des injections parenchymateuses de solution d'ergotine. Voici la relation de ce cas:

M. P., âgé d'une quarantaine d'années, s'est présenté vers le mois de mai 1888 à l'hôpital, avec un éléphantiasis de la verge et du scrotum; la tumeur scrotale mesurait 0m.87 centimètres de circonférence.

D'après les renseignements que j'ai pu avoir des personnes qui habitaient le voisinage du malade, sur l'origine de la tumeur, la cause initiale vient de ce que le malade s'était livré fréquemment à des pratiques de pédérastie. C'est une des causes de l'éléphantiasis dont les ouvrages ne font pas mention, et sur laquelle j'attire votre attention.

Plusieurs chirurgiens étaient d'avis d'opérer le malade en faisant l'ablation de la tumeur. Mais l'idée m'est venue d'essayer les injections de solution d'ergotine dans la masse de la tumeur. L'opération de l'ablation fut donc ajournée, et j'ai fait moi-même les injections, que j'ai répétées tous les deux jours.

Dès le huitième jour j'ai remarqué une diminution de la tumeur; au vingtième jour la tumeur avait diminué de moitié, si bien que le malade ayant eu un devoir impérieux à accomplir est parti pour son village à quelques lieux de la ville, sans prévenir le surveillant de l'hôpital.

Ayant changé de résidence, je n'ai pas pu avoir des nouvelles de mon malade, et je regrette de n'avoir pas retrouvé un cas de ce genre pour appliquer le même remède et en noter le résultat.

Il serait intéressant que ceux d'entre vous qui ont à soigner des cas d'éléphantiasis essaient les injections d'ergotine.

Voici la formule de la solution que j'avais fait préparer: Ergotine, 6 grammes; eau distillée, 10 grammes; glycérine, 8 grammes; mêlez. Mode d'emploi: Injecter deux grammes de cette solution dans la masse de la tumeur, et répéter les injections tous les deux jours.

STATISTIQUE CHIRURGICALE

Du Docteur LÉON AUDAIN,

Ancien interne en médecine et en chirurgie des hôpitaux de Paris, membre correspondant de la Société anatomique de Paris, membre du Jury médical central de la République, du 23 octobre 1891 au 18 juin 1893.

Numéro.	Date.	Sexe.	Initiales du nom.	Histoire.
	1891.			
1	23 octobre	Homme	A. D.	Ophthalmie sympathique. Enucléation de l'œil. Guérison.
2	25 octobre	Homme	S. A.	Anévrisme de la fémorale par balle de révolver. Ligature de la fémorale au-dessous de l'arcade de Fallope. Ouverture et asepsie du foyer hémorrhagique. Guérison.
3	28 octobre	Homme	L. F.	Dacryocystite. Incision des points lacrymaux. Cathétérisme. Antisepsie. Guérison.
4	29 octobre	Enfant	C. D.	Cauthoplastie. Guérison.
5	30 octobre	Homme	B.	Kyste sébacé au grand angle de l'œil, au devant du sac lacrymal. Ablation. Guérison.
6	31 octobre	Femme	A. S.	Curettage de l'utérus. Guérison. Depuis lors accouchement à terme.
7	16 novembre	Homme	D.	Incision du méat. Guérison.
8	17 novembre	Homme	W.	Fibrôme de l'avant-bras. Guérison.
9	18 novembre	Homme	D.	Kyste synovial du poignet. Extirpation. Guérison.
10	20 novembre	Femme	A.	Chémosis (granulations). Excision. Guérison.
11	21 novembre	Femme	N.	Ascite. Ponction.
12	22 novembre	Femme	L.	Ptérygion volumineux. Ablation. Guérison. Récidive ultérieure.
13	24 novembre	Homme	L. B.	Fistules de l'anus anciennes avec suppuration péri-rectale. Opération. Guérison.
14	25 novembre	Homme	R. S.	Hydrocèle. Ponction. Injection iodée. Guérison.
14bis	30 novembre			Kyste de la conjonctive au niveau du limbe scléro-cornéen. Ablation. Guérison.
15	3 décembre	Homme	T. B. L.	Ostéite ancienne du tibia, étendue. Plaie par arme à feu. Evidement. Ablation des séquestres. Grande amélioration.
16	9 décembre	Femme	C. G.	Chalazion de la paupière supérieure droite. Ablation. Guérison.
17	11 décembre	Homme	P.	Ulcère infectueux de la cornée. Destruction au thermo-cautère. Guérison.
18	12 décembre	Enfant	G.	Panophthalmie. Enucléation. Guérison.
19	15 décembre	Enfant	T. P.	Adénite suppurée du cou. Incision. Drainage. Guérison.
20	18 décembre	Enfant	E. E.	Section du filet. Guérison.
21	19 décembre	Homme	M. R.	Phlegmon péri-amygdalien. Ouverture. Guérison.
22	20 décembre	Homme	P.	Rétrécissement complet de l'urèthre. Fistules périnéales. Résection de deux centimètres et demi de la paroi inférieure de l'urèthre. Reconstitution de l'urèthre avec les tissus mous du périnée. Guérison.
23	21 décembre	Homme	L.	Adénite suppurée de l'aine. Incision. Guérison.
24	25 décembre	Femme	V.	Infection puerpérale. Curettage. Drainage de l'utérus. Guérison.
26	25 décembre	Homme	X.	Abcès. Incision. Guérison.
27	27 décembre	Enfant	P.	Abcès lymphangitiques du pied. Incision. Pansements iodoformés. Guérison.
28	28 décembre	Enfant	S.	Plaie de la région fronto-sourcilière. Suture. Guérison.
	1892.			
29	3 janvier	Femme	P.	Furoncles des orteils. Incisions. Pansements iodoformés. Guérison.
30	4 janvier	Femme	L.	Dacryoceptite chronique. Incisions des points lacrymaux. Cathétérisme. Antisepsie. Guérison.
31	7 janvier	Femme	A. D.	Staphylôme total de la cornée. Phénomènes sympathiques. Enucléation. Guérison.

Ancien interne en médecine et en chirurgie des hôpitaux de Paris, etc.—Continued.

Numéro.	Date.	Sexe.	Initiales du nom.	Historie.
	1891.			
32	16 janvier	Jeune fille	A	Abcès de la paupière. Incision. Guérison.
33	16 janvier	Homme	R. C	Plaie de la lèvre supérieure par un coup de pierre. Suture. Guérison.
34	18 janvier	Enfant	G	Amygdalotomie. Guérison.
35	18 janvier	Femme	L. P	Endométrite chronique et congestion ovarienne. Curettage. Instillations intra-utérines au nitrate d'argent. Guérison.
36	26 janvier	Homme	K	Rétrécissements blennorrhagiques de l'urèthre. Dilatation progressive. Guérison.
37	7 février	Femme	C	Cataracte. Extraction sans iridectomie. Bonne guérison.
38	8 février	Garçon	R. M	Papillôme de la langue. Ablation. Guérison.
39	15 février	Homme	C. B	Ptérygion. Ligature. Excision. Guérison.
40	15 février	Femme	T. E	Ulcère infectueux de la cornée. Thermo-cautérisation. Guérison.
41	21 février	Homme	A	Entropion et trichiasis. Résection cunéiforme du tarse. Guérison.
42	23 février	Homme	D	Abcès du scrotum. Incision. Guérison par bourgeonnement.
43	24 février	Homme	L. H	Ophthalmie blennorrhagique. Chémosis. Excision du chémosis. Adherence totale de la cornée et de la paupière supérieure.
44	27 février	Femme	S. B	Fibro-lipôme de la paroi antérieure de l'aisselle, du volume de deux poings, avec large pédicule. Ablation. Guérison.
45	29 février	Demoiselle	A. F	Iridectomie pour pupille artificielle. Résultat peu satisfaisant.
46	29 février	Homme	B	Hydrocèle chyleuse. Ponction. Injection de chlorure de zinc. Guérison.
47	30 février	Femme	C. A	Abcès péri-rectal ouvert dans le rectum. Dissection du rectum. Ablation de la poche. Guérison.
48	3 avril			Vaste leucôme. Iridectomie pour pupille artificielle. Résultat assez bon.
49	4 avril	Femme	G. C	Leucôme considérable de l'œil datant de 25 ans. Tentative de pupille artificielle. Insuccès.
50	6 avril	Homme	N	Arthrite tuberculeuse des articulations sterno-claviculaire et première costo-sternale, avec volumineux abcès par congestion de la face antérieure du thorax. Résection des deux articulations malades. Grattage et excision de la poche de l'abcès. Guérison. Mort au mois de janvier suivant de tuberculose pulmonaire.
51	7 avril	Homme	P. C	Enucléation pour glaucôme chronique, avec douleurs intolérables. Guérison.
52	8 avril	Femme	L	Antéversion. Endométrite du corps. Curettage. Instillations. Guérison. Grossesse ultérieure.
53	8 avril	Homme	E. G	Panaris profond. Incision. Guérison.
54	28 avril	Enfant	C	Abcès péri-articulaire dans une coxalgie. Incision. Grattage. Excision des masses fongueuses. Guérison momentanée.
55	6 mars	Femme	H. B	Phlegmon sous-aponévrotique de la moitié inférieure de la cuisse. Arthrite du genoux. Large ouverture du phlegmon. Drainage. Guérison.
56	7 mars	Jeune homme	L. W	Bouton lépreux de la conjonctive. Excision. Pas de récidive.
57	8 mars	Homme	G	Lépreux. Ptérygion. Excision. Guérison. Récidive.
58	18 mars	Enfant	C. L	Chalazion. Ablation. Guérison.
29	20 mars			Luxation du coude en arrière et en dehors datant de trois semaines. Réduction avec l'appareil de Hennequin. Résultat assez satisfaisant.
60	21 mars	Enfant	C	Amygdalite chronique avec hypertrophie. Amygdalotomie. Guérison.
61	23 mars	Homme	P. C	Glaucôme avec vives douleurs. Sclérotomie. Persistance des douleurs.
62	25 mars	Demoiselle	B	Staphylôme total de la cornée avec troubles sympathiques. Enucléation. Guérison.

Ancien interne en médecine et en chirurgie des hôpitaux de Paris, etc.—Continued.

Numéro.	Date.	Sexe.	Initailes du nom.	Historie.
	1892.			
63	26 mars	Homme	L. S.	Hydrocèle. Sur sa demande, ponction simple. Récidive.
64	26 mars	Homme	E. L.	Luxation intra-coracoïdienne de l'épaule datant d'un mois. Réduction sous le chloroforme, avec l'appareil de Hennequin. Bonne guérison.
65	10 mars	Femme	D.	Cataracte diabétique. Ablation sans iridectomie. Guérison.
66	12 mars	Femme	F. K.	Lipôme de la nuque du volume du poing. Sessile. Ablation. Guérison.
67	18 mars	Homme	S. P.	Plaie de la bouche par balle de révolver, il y a un mois. Balle retrouvée et enlevée au niveau de la bosse occipitale externe. Guérison.
68	21 mars	Homme	D.	Abcès urineux. Incision au thermo-cautère. Guérison par bourgeonnement.
68bis	24 mars			Vaste leucôme d'origine blennorrhagique. Kératotomie avec iridorrhexis. Cas peu favorable.
69	29 mars	Homme	D.	Circoncision pour phimosis. Guérison.
70	30 mars	Homme	E. S.	Ptérygion. Ligature et excision. Guérison.
71	4 mai			Plaie pénétrante de la cornée avec prolapsus de l'iris. Excision de l'iris. Guérison.
72	7 mai	Homme	L. E.	Destruction des adhérences qui fixaient totalement la cornée à la paupière supérieure. Résultat satisfaisant.
73	10 mai	Femme	B.	Panaris du pouce. Incision. Guérison.
74	14 mai	Homme	H. R.	Infiltration profonde d'urine. Gangrène très étendue. Opération in-extremis. Mort.
75	27 mai	Femme	I. M.	Cataracte. Extraction. Quelques mois après, cataracte secondaire.
76	30 mai	Homme	D.	Rétrécissement blennorrhagique de l'urèthre. Fistule du périnée. Uréthrotomie externe. Résection partielle de l'urèthre. Bulboplastie pour corriger une déviation marquée de l'urèthre. Formation d'un nouvel urèthre avec les tissus mous du périnée, après ablation de la fistule. Guérison.
77	1er juin	Homme	A.	Tumeur de la nuque et du cuir chevelu de nature probablement épithéliomateuse. Ablation. Guérison.
77bis	2 juin			Plaie de la cuisse par coup de couteau, dans le voisinage des gros vaisseaux. Guérison.
78	6 juin	Femme	M.	Cataracte. Extraction avec iridectomie. Malade indocile. Résultat peu favorable.
78bis	29 juin			Adénite cervicale suppurée. Incision. Pansements iodoformés. Guérison.
79	30 juin	Homme	S. B.	Cure radicale d'hydrocèle. Guérison.
80	4 juillet	Homme	N. N.	Rétrécissement blennorrhagique de l'urèthre. Dilatation progressive. Guérison.
81	8 juillet	Homme	G.	Phlegmon sous-cutané du bras, d'origine lymphangitique. Incision. Drainage. Guérison.
82	18 juillet	Femme	C.	Bartholinite chronique. Incision. Pansements iodoformés. Guérison.
83	1er août	Homme	B. D.	Rétrécissement blennorrhagique de l'urèthre. Dilatation progressive. Guérison.
84	2 août	Enfant	N.	Staphylôme de la cornée, suite de traumatisme. Opération de Critchett. Guérison.
85	3 août	Homme	P.	Phlegmon de l'aisselle, consécutif à une plaie du doigt. Incision. Drainage. Guérison.
86	5 août	Femme	L.	Epithélioma du sein. Ablation. Guérison. (En juin 1893, pas encore de récidive.)
87	5 août	Homme	N. L.	Abcès de l'amygdale. Incision. Guérison.
88	9 août	Enfant	H. G.	Chalazion. Ablation. Guérison.
89	10 août	Homme	S. T.	Cure radicale d'hydrocèle. Guérison.

Ancien interne en médecine et en chirurgie des hôpitaux de Paris, etc.—Continued.

Numéro.	Date.	Sexe.	Initiales du nom.	Historie.
	1892.			
90	12 août	Homme	S	Dacryocystite chronique. Incision des conduits lacrymaux. Traitement. Guérison.
91	12 août	Homme	C	Plaie de la cornée. Plaie pénétrante de l'œil. Suppuration par défaut d'antisepsie. Eviscération. Guérison.
92	13 août	Homme	C. T	Paraphimosis très serré d'origine vénérienne. Débridement. Guérison.
93	20 août	Homme	J. H	Rétrécissement de l'urèthre, d'origine blennorrhagique. Fistules du périnée. Fistules vésico-abdominales. Uréthrotomie externe. Résection partielle de l'urèthre. Ablation des fistules périnéales et vésico-abdominales, ainsi que leur trajet. Pas de suture de la peau au niveau du périnée. Guérison par bourgeonnement.
94	21 août	Homme	A	Plaie complète de la cornée. Pansements antiseptiques. Guérison.
95	23 août	Homme	S	Cure radicale d'hydrocèle. Guérison.
96	25 août	Homme	R. C	Ptérygion. Excision. Guérison.
97	30 août	Homme	F	Cure radicale d'hydrocèle. Guérison.
98	5 septembre	Femme	D. P	Endométrite chronique. Curettage. Guérison. (Quatre mois après l'opération, grossesse.)
99	7 septembre	Enfant	M	Abcès de la marge de l'anus. Incision. Pansements iodoformés. Guérison.
100	14 septembre	Homme	A. B	Ascite. Ponction abdominale. Guérison.
101	16 septembre	Femme	H	Ptérygion. Ligature. Excision. Guérison.
102	16 septembre	Femme	G. S	Abcès lymphangitique de jambe. Incision. Pansements iodoformés. Guérison.
103	22 septembre	Homme	O. S	Hydrocèle compliqué d'un second sac développé aux dépens du cul-de-sac inter-épidydimo-testiculaire. Ablation des deux sacs. Guérison.
104	24 septembre	Homme	E. R	Phimosis. Circoncision. Guérison.
105	28 septembre	Enfant (âgée de 6 mois).		Angiôme de la paroi antérieure de l'abdomen. Ablation au bistouri (hémostase préventive et morcellement). Guérison.
106	29 septembre	Jeune fille	J	Tumeur polypeuse des fosses nasales. Ablation au bistouri. Guérison.
107	29 septembre	Homme	G	Plaie de la main par balle de révolver perdue dans les tissus mous. Pansements antiseptiques. Guérison.
108	8 octobre	Femme	A. B	Lympho-sarcôme volumineux de l'aisselle. Ablation. Guérison. Récidive quatre mois après.
109	8 octobre	Homme	C	Ulcère infectueux de jambe. Pansements antiseptiques. Guérison.
110	17 octobre	Enfant (âgée de 6 mois).		Angiôme du cuir chevelu. Ablation au bistouri (hémostase préventive et morcellement). Guérison.
111	21 octobre	Homme	E. A	Ptérygion double. Excision. Guérison.
112	22 octobre	Jeune fille	M	Fibrômes bilatéraux des lobules de l'oreille, autour des conduits des boucles d'oreille. Ablation. Guérison.
113	24 octobre	Enfant (de 4 jours)		Spina bifida, avec ulcération de la peau. Ouverture du spina. Dissection de la moelle adhérente. Excision du sac. Suture des méninges. Suture de la peau. Mort le lendemain d'hydrocéphalie.
114	24 octobre	Homme	S	Amygdalite chronique, avec exudat dans les cryptes. Discision. Guérison.
115	7 novembre	Femme	A. S	Pyorrhée alvéolo-dentaire. Incision des gencives. Pansements antiseptiques. Guérison.
116	13 novembre	Homme		Hydrocèle du volume d'une tête d'enfant. Cure radicale. Orchidopexie. Résection du scrotum. Guérison.
116bis	23 novembre			Hydrocèle double. Cure radicale en une séance. Guérison.
117	11 décembre	Femme	X	Epithélioma du sein droit, avec ganglions axillaires. Ablation. Guérison. (En juin 1893, pas encore de récidive.)
118	16 décembre	Femme	D	Œil staphylomateux. Douleurs ciliaires vives. Enucléation. Guérison.

Ancien interne en médecine et en chirurgie des hôpitaux de Paris, etc.—Continued.

Numéro.	Date.	Saxe.	Initiales du nom.	Historie.
	1892.			
119	17 décembre	Femme	H	Endométrite hémorrhagique. Curettage. Guérison.
120	20 décembre	Homme	C	Pyorrhée alvéolo-dentaire. Incision des gencives. Pansements antiseptiques. Guérison.
121	26 décembre	Homme	C	Plaie de jambe avec lymphangite. Pansements antiseptiques. Guérison.
	1893.			
122	9 janvier	Femme	D. A	Déchirure ancienne et complète du périnée. Périneorrhaphie. Guérison.
123	10 janvier	Femme	X	Ophthalmie sympathique. Enucléation. Guérison.
124	15 janvier	Femme	V	Epithélioma du sein gauche, avec ganglions nombreux sous-pectoraux et axillaires. Ablation. Guérison. (En juin 1893, pas encore de récidive.)
125	18 janvier	Enfant	C	Phlegmon sous-cutané du bras. Larges incisions. Drainage. Guérison.
126	1er février	Homme	C	Végétations de la verge. Excision. Guérison.
127	5 février	Femme	X	Glaucôme ancien, avec douleurs violentes. Enucléation. Guérison.
128	8 février	Enfant	L	Section du filet. Guérison.
129	13 février	Femme	B. V	Phlegmon péri-amygdalien. Incision. Guérison.
130	20 février	Homme	B	Chalazion. Ablation. Guérison.
131	20 février	Femme (âgée de 70 ans).	M. L	Pustule maligne de la face. Incision au bistouri. Thermo-cautérisation. Guérison.
132	24 février	Femme	C	Ptérygion double. Transplantation. Guérison.
133	26 février	Femme (âgée de 72 ans).	X	Epithélioma du sein, avec ganglions axilliaires. Ablation. Guérison.
134	2 mars	Homme	W	Phlegmon gangréneux d'origine diabétique de la région de l'aine et du testicule, avec fusée sous la paroi abdominale. Ablation de toutes les parties sphacelées. Guérison.
135	3 mars	Homme	H	Appendicite et péri-appendicite. Corps étranger (une graine). Laparotomie. Guérison.
136	8 mars	Homme	E. B	Chalazion. Ablation. Guérison.
137	10 mars	Homme	L. S	Hydrocèle. Cure radicale. Guérison.
138	16 mars	Homme	J. H	Vaste ptérygion double. Ablation. Guérison.
139	20 mars	Homme	J	Abcès urineux. Incision. Guérison.
140	2 mai	Jeune homme	P	Hydrocèle. Cure radicale. Guérison.
141	4 mai	Femme	P. C	Endométrite chronique. Curettage. Guérison.
142	7 mai	Femme	V	Epithélioma du sein avec ganglions axillaires. Ablation. Guérison. (Cette femme portait un épithélioma du sein, de chaque côté. Cette opération est la deuxième.)
143	8 mai	Homme	B	Plaie de l'oreille par balle de révolver. Traitement. Guérison. Balle perdue.
144	15 mai	Jeune fille	R	Panaris, en bouton de chemise, du pouce. Incision. Pansements iodoformés. Guérison.
5	23 mai	Femme	J. B	Kyste paraovarique. Double kyste dermoïde multiloculaire des ovaires: l'un contenant 8 litres de liquides et pesant 2,000 grammes; l'autre inférieur au volume du poing. Laparotomie médiane. Ablation du kyste paraovarique et du volumineux dermoïde. Ligature en chaînes des pédicules qui ont été abandonnés dans l'abdomen. Pas de drainage. Guérison.
46	27 mai	Homme	B	Hémorrhoïdes internes et externes. Contracture du sphincter anal. Dilatation digitale, sous le chloroforme. Guérison.
147	5 mai	Homme	E	Lipôme volumineux sous-aponévrotique de la région lombaire. Ablation par morcellement. Guérison.
148	18 juin	Enfant (12 ans)	B	Bec-de-lièvre. Opération. Guérison.

LA CÁMARA POLAR EN EL TRATAMIENTO DE LA FIEBRE AMARILLA.

Por el Doctor PEDRO PEÑUELAS FORNESA,

Inspector Jefe de Sanidad Militar de la Isla de Cuba.

No se concibe la reunión de un congreso médico en América, sin que el tema de la fiebre amarilla sea el más importante punto sometido á discusión.

Numerosos serán sin duda los trabajos que sobre este tema se prescriben por los delegados médicos en el Congreso Pan-Americano, y deseando contribuir á las investigaciones que sobre la terapéutica de la endemia mexicana se puedan llevar á cabo, me permito acompañar las actas de los trabajos de la comisión que en el hospital militar de la Habana funcionó recientemente ensayando la Cámara Polar, inventada por el Dr. Alfredo García, de Santiago de Cuba.

Los médicos militares de las antillas españolas han atendido siempre con gran interés a todo lo que se refiere al tratamiento de la fiebre amarilla y como el medio propuesto por el Dr. García llegó á adquirir alguna resonancia, de ahí que con verdadero interés se hayan seguido estos ensayos, lamentando todos que por falta de medios de experimentación no sean concluyentes los datos que la comisión presentó. Sin embargo, á falta de otro mérito el informe que se acompaña será estimado con seguridad por los congresistas si tienen en cuenta que antes, quizás, de conocerse publicamente en esta Isla los trabajos de la comisión, se dan á conocer á los ilustrados profesores que constituyen la gran reunión científica citada en Washington. Por mi parte me complazco al acompañar estas actas en dirigiros mi entusiasta saludo ya que las obligaciones de mi cargo me impiden tomar parte en vuestras deliberaciones.

Acta de la Primera Sesión.

En la ciudad de la Habana, á los diez y nueve dias del mes de Agosto de mil ochocientos noventa y dos, reunidos en la sala de juntas del Hospital Militar de esta plaza, Sres. subinspector médico, primero graduado, médico mayor, Don Casimiro Roure Boffils; médico mayor, Don José Lanzarot y Herreros; médicos primeros, Don Segundo Bellver y Mateo, Don José Clairac y Blasco; farmacéutico mayor personal primero, Don Gastón Alonso y Cuadrado, y el Sr. Don Alfredo García y García, que fueron citados préviamente por el primero de dichos señores, se dió lectura por el Dr. Roure á una comunicación que dijo haber recibido del señor inspector director subinspector de Sanidad Militar de esta Isla, que al pié de la letra dice así: Hay un sello que dice—Dirección Subinspección de Sanidad Militar de la Isla de Cuba. Sección primera—Número mil quinientos veinte y cuatro. El Excmo. Sr. Capitan General de esta Isla con fecha de ayer me dice lo que sigue: En vista de lo manifestado por V. S. en su escrito de 11 del actual, he tenido á bien aprobar que los médicos y farmacéutico del cuerpo á su cargo á quienes se contrae, formen parte de la comisión encargada de estudiar los resultados de la Cámara Polar ideada por el Dr. Don Alfredo García, exceptuándose los profesores médicos Osuna y Zugasti, porque las comisiones que desempeñan les impedirán emplear toda su solicitud en la nueva, para que V. S. los propone, en la cual deberán aprovecharse también los servicios del profesor Don José Clairac. Esta comisión, tan pronto haya terminado sus observaciones, emitirá un informe detallado acerca del juicio que le merezca el sistema del Dr. García como medio de combatir la enfermedad endémica. Lo participo á V. S. para su conocimiento, efectos y en contestacion. Lo que traslado á V. S. para su conocimiento, efectos y en contestación significarle que la comisión la componen los Sres. Don José Lanzarot, Don Segundo Bellver, Don Felix Extrada y Don Gastón Alonso Cuadrado y el referido Sr. Clairac, los cuales se pondrán á sus órdenes para que de acuerdo V. S. con el director del hospital militar de esta plaza y auxiliado por el inventor, Dr. García, verifiquen el estudio é instalacion de la referida Cámara Polar.—Dios guarde á V. S. muchos años. Habana, diez y siete de agosto, mil ochocientos noventa y

dos. Pardiñas.—Rubricado. Hay á la izquierda una rúbrica.—Sr. Médico Mayor, Don Casimiro Roure. Significando después de la lectura de este oficio todos los concurrentes haber recibido su nombramiento para formar parte de la comisión que ha de estudiar en el hospital militar el tratamiento de la fiebre amarilla por la Cámara Polar, quedó constituida aquella, designándose como secretario al vocal más moderno, médico primero, Don Felix Extrada Catoyra.

Por el vocal nombrado secretario se dió lectura á este oficio de la dirección subinspección de Sanidad Militar que dice así: Hay un sello que dice—Dirección Subinspección de Sanidad Militar de la Isla de Cuba. Sección primera. Número mil quinientos treinta y tres. Como continuación á mi escrito fecha de ayer comunicándole el nombramiento de la comisión que debe estudiar los efectos de la aplicación de la Cámara Polar en la fiebre amarilla, como instrucción general á que debe atenerse la indicada comisión y para que V. S. como presidente de la misma lo tenga presente, adjunto le acompaño copia con el número uno del escrito elevado á la Capitanía General, proponiendo el ensayo de la Cámara Polar en el hospital militar de esta plaza y copia con el número dos de la propuesta elevada á la misma superior autoridad de una comisión para realizar el indicado ensayo, significándole además para el mismo efecto que V. S. como presidente de la comisión, oyendo préviamente al Dr. Don Alfredo García, determinará el número y condiciones del personal de plana menor que se necesita para este especial servicio, y designará un miembro de la comisión que se encargará del régimen interior de esta clínica especial, las libretas correspondientes, diario de observaciones y demás documentos, siendo su misión, como también de la comisión enteramente independiente del régimen que para clínicas de hospitales se sigue en el mismo, haciéndole presente por último que los jefes y oficiales del mencionado hospital tendrán derecho á estudiar los sucesos patológicos que ocurran en los enfermos observados y las indicaciones y prescripciones que se dispongan, en pero cuidando V. S. y los miembros de la comisión evitar cortesmente por lo que se refiere á aquellos toda observación que pueda contrariar al médico encargado. De lo expuesto participo á V. S. que doy conocimiento con esta fecha al director del hospital para su conocimiento y para que atienda con la solicitud é interés que acostumbra, á la realización de este servicio. Dios guarde á V. S. muchos años. Habana, diez y ocho agosto, de mil ochocientos noventa y dos. Pardiñas.—Rubricado. Hay á la izquierda una rúbrica.—Sr. Médico Mayor, Don Casimiro Roure. Hay un sello que dice: Dirección Subinspección de Sanidad Militar de la Isla de Cuba. Copia número uno. Hay un membrete que dice: Dirección Subinspección de Sanidad Militar. Excmo. Señor—En el año próximo pasado, á consecuencia de mandato de esa Capitanía General, se estableció en el Hospital Militar de Santiago de Cuba una Cámara Polar para ensayar la enfermedad de la fiebre amarilla en sus efectos, lo que se cumplimentó no habiendo, por falta de enfermos, más que una observación de éxito desgraciado ó dudoso en cuanto á la causa eficiente de la defunción. Interesada la licencia en llevar á cabo observaciones bastantes para llevar á cabo y poder formar juicio exacto sobre la eficacia de dicho procedimiento, estimo oportuno que para que tengan lugar dichas experiencias se instale en el hospital militar de esta plaza la Cámara Polar de referencia, permitiéndome hacer presente á V. E. no debe ofrecer dificultades administrativo-económicas si su gasto de instalación se aplica á material de hospitales y su entretenimiento después á la estancia medicinal. Si lo que he tenido la honra de proponer á V. E. mereciese su aprobación, le propondré después el personal y reglamento interior de dicha cámara para que su resultado tenga la autorización más completa. Dios guarde á V. E. muchos años. Habana, treinta de Julio, de mil ochocientos noventa y dos.—Excmo. Sr. Antonio Pardiñas.—Excmo. Sr. Capitan General de esta Isla.—Es copia.—El secretario, Pedro Altayó.—Rubricado.—Visto bueno.—El director subinspector, Pardiñas.—Rubricado. Hay un sello que dice: Dirección Subinspección de Sanidad Militar de la Isla de Cuba. Hay un sello que dice: Dirección Subinspección de Sanidad Militar de la Isla de Cuba.—Copia número dos. Hay un

membrete que dice: Dirección Subinspección de Sanidad Militar. Excmo. Señor—Autorizado por V. E. el ensayo en el hospital militar de esta plaza de la Cámara Polar, ideada por el Dr. Don Alfredo García para el tratamiento de la fiebre amarilla, tengo el honor de proponer á V. E. el nombramiento de una comisión compuesta de los médicos mayores Don Casimiro Roure, Don Mariano Osuna y Don José Lanzarot; los primeros Don Segundo Bellver, Don Felix Extrada, Don Victor Zugasti y farmacéutico mayor Don Gastón Alonso Cuadrado, encargado de estudiar los efectos del iniciado tratamiento con asistencia de su inventor y ayudados de sus indicaciones, informada ámpliamente cuando el número de observaciones le permiten formar completo juicio. Dios guarde á V. E. muchos años. Habana, once de agosto, de mil ochocientos noventa y dos.—Excmo. Sr. Pardiñas.—Rubricado. Hay una rúbrica: Excmo. Sr. Capitan General de esta Isla. Es copia.—El secretario, Pedro Altayó. Rubricado.—Visto bueno.—El Dr. subinspector, Pardiñas.—Rubricado. Hay un sello que dice: Dirección Subinspección de Sanidad Militar.

Terminada la lectura de estos oficios, el señor presidente manifestó que, según lo que se disponía por la superioridad, había citado á esta reunión al Dr. Don Alfredo García y García, autor del procedimiento de la Cámara Polar, y estando presente le rogaba informase á la comisión no sólo de los medios que eran necesarios para llevar á la práctica el tratamiento de su invención, sino también que expusiese cuanto considerase pertinente al objeto que motivaba esta comisión.

El Dr. García, atendiendo esta indicación, comenzó por significar su satisfacción al verse rodeado de compañeros del Cuerpo de Sanidad Militar, al que había pertenecido algunos años, y que sus primeras palabras debían ser de gratitud hacia la Superior Autoridad de la Isla por la benévola acogida que le había dispensado, agradecimiento que hacía extensivo al señor inspector de Sanidad Militar por haber facilitado los medios de hacer sus ensayos en esta capital, y á los miembros de la comisión por la deferente atención que guardaban con él. Exponiendo de seguida el concepto de su tratamiento, dijo: Que desde hace algunos años viene ocupándose con interés del estudio de la fiebre amarilla, como todos los profesores médicos de esta Isla. Que el concepto de ser una enfermedad infecciosa no puede negarse; creyendo en la acción sucesiva de las infecciones en un individuo, fundado en que si durante el curso de la fiebre amarilla, que suele ser de cinco á siete días, el enfermo continua en un medio ambiente parecido á aquel en que contrajo la afección, es lógico suponer las sucesivas infecciones y que las posteriores deben ser cada vez mayores, tomando una parte más activa en el proceso é influyendo en su terminación. Que pensando así, dada la índole infecto-infecciosa de los vómitos, la evaporación vesicular del sudor y las corrientes gaseosas de la respiración, cada enfermo debe convertirse en un foco perenne de infección, y si adquirió la primera infección en un medio ambiente simplemente epidémico, no tardará la atmósfera que le rodea en estar saturada de gérmenes infecciosos. Por eso las salas especiales de vómito dan tanta mortalidad, y se han suprimido en casi todos los hospitales.

La importancia de las nuevas infecciones está demostrada por los experimentos de inoculación de Chaveaux, Walson, Cheryne y Bouchard, probando este último que el número de microbios introducidos en el organismo influye en la gravedad é intensidad de los síntomas. Teniendo en cuenta la importancia que los autores dan á las infecciones sucesivas, vislumbró en el tratamiento por la cámara un medio de evitar que los gérmenes del exterior puedan invadir nuevamente al enfermo, aislándolo en una atmósfera lo más aseptica posible, por la corriente de aire que se establece en el aparato, cuya corriente arrastra las bacterias procedentes del enfermo hacia el exterior; creyendo que si este aislamiento se hace dentro de las primeras veinte y cuatro horas se logra además colocar al enfermo en mejores condiciones para la defensa orgánica, antes de que sobrevenga la debilidad y postración del segundo período.

Después hace el Dr. García un juicio comparativo de la fiebre amarilla con otras enfermedades de origen cimótico, y dice que en las oftalmías de los campamentos lo que más favorece es el lavado y limpieza del globo ocular, dificultando por este

medio las nuevas infecciones, y que en el paludismo basta muchas veces el cambio de localidad y hasta de habitación para lograr la curación, y por eso cree que en la enfermedad de que se trata el aislamiento y la renovación del aire es un medio de combatir la endemia.

Por lo que hace al frío, dice, es un agente terapéutico poderoso que no puede ponerse en duda. En 1851 Brown-Sequard en unión de Tholeozan, pusieron en claro la acción *sui generis* del frío, observando que metiendo una mano á cero grado se contraían bastante los vasos de la otra mano. Henry comprobó por la mediación que los órganos disminuían de volumen después de una ducha fría. El mismo Brown-Sequard en sus lecciones nos demuestra que la aplicación del hielo sobre la piel obra como toda otra irritación sobre los nervios vaso-motores, pero con más actividad, y que modifica mejorando la nutrición de los centros nerviosos, sobre todo de la base del encéfalo. Los resultados de la aplicación del hielo en las congestiones cerebrales, las opiniones de Michaelis, de Kid, Helsn y Kirwseh sobre la curación del tétano aplicando hielo á la columna vertebral, el uso de las sábanas frías y de baños fríos en la fiebre amarilla, etc., fueron tenidos en cuenta para sus primeras experimentaciones.

En el segundo período del tifus icterodes la mayor parte de los órganos son asiento de graves procesos flogísticos, y con la baja temperatura cree hallar un medio profiláctico. La anuria cree también que puede combatirla con su procedimiento, pues el frío es estimulante del riñón y por consiguiente diurético. Las altas temperaturas son de temer en esta enfermedad, habiendo que conceder también al frío una acción antitérmica.

No cree como se ha supuesto que la Cámara Polar ejerza una acción directa sobre el microbio de la fiebre amarilla, pero sí que puede modificar el medio que para su desarrollo necesita. La biología nos dice que el microbio como la célula necesitan de un medio especial para vivir y desempeñar sus funciones; así como sabemos por la bacteriología que basta un insignificante cambio en las condiciones del terreno para que el cultivo se debilite y hasta desaparezca la producción.

No conocemos el microbio de la fiebre amarilla, dice, pero sabemos que esta enfermedad no se conoce en los países fríos, y que cuando se desarrolla en latitudes intermedias, desaparece con el descenso de la temperatura atmosférica; citando como ejemplo conocido el de una barca americana infestada, mandada al mar glacial por el gobierno de Boston, en la que desapareció la fiebre amarilla al llegar á bajas temperaturas, reapareciendo la enfermedad al regresar al puerto de salida dos años después al llegar á la latitud propia del mal.

No acepta que la baja temperatura mate el microbio del vómito, pues hay microorganismos que resisten á ciento diez grados bajo cero, y por eso rechaza la idea de que esto suceda en la cámara, cuya temperatura es muchísimo más elevada. Aunque el frío atenue la virulencia del microbio é impida su desarrollo no sólo no lo destruye, sino que lo deja en condiciones de adquirir su primitiva virulencia al colocarlo en medio apropiado.

Cree que el microbio podrá ser la causa específica, pero no la determinante. Las reacciones que tienen lugar en los líquidos, humores y tegidos cuando la enfermedad está en el primer período de estado ó próxima á su terminación, no quiere decir las condiciones del medio, pues son los resultados de las ptomainas, leucomainas y demás productos patológicos agenos á los elementos necesarios para el desarrollo de la infección. Sean las que fueren las condiciones del medio, cree que deben atribuirse al calor, y al sustraer á los enfermos de esta causa, considera que la cámara cambiará las condiciones del organismo convirtiéndole en terreno impropio al desarrollo del mal.

Dice que á poco que se reflexione se comprenderá que la oportunidad para poder utilizar la cámara pasa pronto, pues sólo dura las breves horas del ciclo vital de la causa específica.

Cuando se están desarrollando los primeros cultivos concíbese posible que un remedio ó agente terapéutico logre oponerse á la exagerada multiplicación de los

gérmenes, neutralizando los nocivos efectos que sobre el libre funcionamiento de las células tengan los productos fabricados por el agente patógeno.

Después de exponer esta teoría que indica el Dr. García fué el primitivo fundamento de su invento de la Cámara Polar, describe el aparato diciendo que lo denominó así porque en un principio sostenía la temperatura interior del mismo á cero grados y aún ménos; que en la actualidad no llega á poner los enfermos á tan baja temperatura, pues observaciones de su experiencia le han hecho comprender que para su objeto basta sostener la temperatura interior de la Cámara á diez ó doce grados centígrados.

Enseña el Dr. García á la comisión unas fotografías de su aparato y añade: El aire entra en la cámara por el espacio que separa el techo movible de las cuatro paredes y como es superior su temperatura á la del aire interior que rodea al enfermo, experimenta un brusco enfriamiento que lo condensa inmediatamente. Una parte del vapor acuoso, producto de su condensación, se solidifica al ponerse en contacto con las paredes interiores y el techo de la cámara, y otra se mantiene suspensa en el aire en forma de rocío. Este es aspirado por el enfermo y absorbido rápidamente por la mucosa respiratoria, va á mezclarse con la sangre diluyendo los venenos solubles que esta contiene, aumentando la tensión renal y obrando como poderoso diurético. Como consecuencia de la absorción de este rocío, los enfermos lejos de tener sed, hasta se resisten á beber agua, permitiendo esto el descanso absoluto del estómago, segregando cantidades grandes de orina según ha observado en muchos enfermos. La acción del frío de la cámara obra no solo como agente terapéutico, sino que es el medio esterlizador del aire que llena el aparato y produce el lavaje de la sangre del enfermo.

Como el aire que penetra por las aberturas superiores sale una vez enfriado por las inferiores á causa de su mayor densidad, se verifica de una manera cumplida la renovación y circulación constante activa y libre del aire, ejerciendo á su paso por el aparato una bienhechora influencia; obrando el frío como ha significado, modificando el desarrollo, la evolución natural del padecimiento, lo que hasta ahora no se ha logrado con sólo la terapéutica farmacológica. Cree que la cámara yugula atenúa los síntomas del segundo período; el frío y la obscuridad son de acción sedante; la salida del aparato produce un efecto opuesto, pues el calor y la luz, así como el oxígeno y la materia nutritiva, constituyen uno de los principales elementos de la existencia activa, reaccionando los enfermos: considerando esta segunda parte del tratamiento como medio estimulante más poderoso que el éter y los extrícnicos empleados en 1847 por Rouanet en New Orleans.

Seguidamente el Dr. García presentó una estadística de los casos tratados por él en Santiago de Cuba (cuya estadística se acompaña á esta acta), significando á la comisión que ofrecía las garantías siguientes: 1ª. Los diagnósticos fueron formulados por varios profesores. 2ª. Por avanzado que haya sido el período de fiebre amarilla no se le han negado los auxilios de la cámara á ningún enfermo, aunque algunos presentaron otras enfermedades intercurrentes.

Dijo que no venía aquí á hacer estadística, pues estas tenían que ser muy numerosas para que tuviesen valor positivo; que sólo deseaba que por sus compañeros se comprobasen los hechos que había expuesto como resultado de sus observaciones.

Terminó su discurso manifestando que si había alguna objeción que hacerle á estas ligeras ideas expuestas sobre su procedimiento, estaba dispuesto á la discusión que se estableciese, deseando llevar al ánimo de todos los presentes el convencimiento de que su tratamiento no lo consideraba como una panacea, pero sí como el medio terapéutico más ventajoso de todos los seguidos hasta la actualidad.

El Sr. Bellver pidió la palabra y dijo: Que después de haber oido al Dr. García, como vocal de la comisión, y animado por la franca invitación del autor para analizar los fundamentos en que basa la terapéutica del vómito, se cree en el deber de hacer uso de la palabra con el objeto de poner de relieve lo distanciado que se halla

respecto de algunos de los principales puntos que sirven de partida al tratamiento de la fiebre amarilla por la Cámara Polar.

Está de acuerdo en que la enfermedad de que se trata es una infección, y el Dr. García se muestra con ellos satisfecho y suficientemente autorizado para seguir adelante, mas no puede desconocerse que en la actualidad esta noción es muy vaga y deleznable para fundar nada serio que llene las exigencias del método experimental por lo que respecta á la noción etiológica; se precisa algo más, talvez mucho más para trazar derroteros terapéuticos. ¿Se trata de una infeccion general ó de una infección local? y en este último caso, ¿de qué órganos y tejidos? Esto por lo menos fuera necesario en clínica para proceder de una manera racional y científica, sin desconocer la importancia y trascendencia que aportaría el aislamiento del agente y el conocimiento de sus interesantes detalles, etc.

En obsequio de la brevedad y sin citar nombres de todos conocidos, conviene dejar consignado el estado actual de nuestros conocimientos sobre la etiología del vómito. La sangre no da culturas ni por el método de los aerobios ni por el de los anaerobios. De los órganos lesionados el tubo digestivo es en el que se manifiestan prematura y constantemente las lesiones que le son características, es por otra parte el gran terreno para las infecciones, por los materiales peptonizados que contiene y por su correspondencia directa con el pericosmos, por el intermedio de los alimentos y bebidas, que son, como es sabido, los vectores de gran número de gérmenes, sin excluir los que directamente sean conducidos por el aire al ser respirado, y que la saliva aprisiona y conduce al estómago. Tenemos, pues, fundados motivos, sinó para dar por resuelto el problema patogenésico, al menos para tener un punto de partida de gran interés clínico: "La fiebre amarilla es una infección gastro-intestinal."

Las sucesivas y continuadas infecciones que lógicamente dice, hay que suponer se efectuan cuando el enfermo continua en el mismo ó parecido medio ambiente en que contrajo la enfermedad, creyendo deben ser cada vez mayores y que han de influir de una manera desastrosa en el curso y terminación del proceso, piedra angular del tratamiento que propone el Dr. García, resulta á todas luces paradójica, teórica experimental y clínicamente sin apoyo. Se funda primero: en que por el lavado del globo ocular se evitan las nuevas infecciones en la oftalmía de los campamentos, por lo cual el proceso desaparece; segundo, que las fiebres palúdicas se curan trasladando al enfermo á otra localidad lejos del foco y hasta á otra casa ó habitación de la misma que habita, y tercero, que en las salas especiales de fiebre amarilla es mayor la mortalidad porque las infecciones consecutivas pueden tener efecto con más seguridad.

Á primera vista resalta que la interpretación de estos hechos no se ajusta á los principios científicos que los informan: la oftalmía infecciosa cede por los lavados antisépticos y hasta por los simples, no porque evite las nuevas infecciones venidas del exterior, sino porque dificulta las nuevas generaciones de los gérmenes ya situados y bien por acción química y mecánica con el líquido antiséptico ó sólo por la última en el lavado aséptico, libra á la mucosa ocular de los agentes flogógenos. Esta oftalmía y la fiebre amarilla si bien infecciones de superficie, no tienen puntos de contacto para sacar de ello el partido que se propone el Dr. García.

Respecto á la segunda, hemos de dejar sentado que no existe analogía entre la materia y la fiebre amarilla. La infección matérica es de las pocas enfermedades infecciosas que no confían inmunidad temporal ó permanente, sino que por el contrario dejan al organismo un aumento de receptividad que se exagera á medida que las recidivas se suceden. En cambio la fiebre amarilla es tal vez la infección tópica por excelencia para inmunizar de una manera radical y permanente los organismos que invade.*

* Esto que es incontrovertible cuando el proceso sigue el ciclo clínico que le asignaban los antiguos, tiene en su sentir una excepción y es la siguiente: Cuando la antisepsia de la superficie infectada es eficaz y precoz, dando por resultado el aborto de la infección, puede el sugeto no quedar inmunizado, punto que trata en un trabajo próximo á presentar á la Dirección Subinspección de Sanidad Militar.

En las afecciones del tipo de que tratamos, el número de microbios influye más aún que en el tono de gravedad en su determinación, en vencer las resistencias del terreno. Un solo microbio patógeno de virulencia triplicada podrá determinar la infección en un medio que le sea favorable, y podrá el proceso ser grave y hasta mortal. Un millón de virulencia triplicada atravesará, sin fijarse, el tubo digestivo y por lo tanto sin dar señales de su paso cuando ese terreno sea estéril. Á mayor número y más exaltada virulencia en igualdad de condiciones, el medio, la gravedad del proceso estará en relación directa de esos factores. Mas para que esto suceda no se precisa que sigan ingresando los agentes específicos y agregándose miles y millones de colonias de distintas edades, bastando las iniciales, y no hay necesidad de más para darnos cumplida cuenta de los graves trastornos toxhémicos que se manifiestan por la busca sacudida del sistema nervioso, protesta de la insuficiencia normal del organismo, en demanda de mayores y más radicales energías. Esto tendría inconveniente en admitir en el período de incubación, importancia al ingreso repetido del agente patógeno, circunstancias que en esos momentos es valorizable y digna de ser tenida en cuenta, tanto para la gravedad del proceso cuanto para la duración del dicho período. Mas constituida la población microbiana en extensas barriadas, cuando surge de conflicto invasión, son millones de millonadas los microscópicos poblados y como sus ciclos solares son de muy pocas horas y su multiplicación incalculable, ¿qué importancia le daremos en buena lógica á menos ingresos de algunos cientos miles ó millones, que por otra parte se hallarían desfavorecidos en la lucha por la existencia, en un medio laboreado por sus colegas? Por otra parte, y viniendo al terreno de los hechos que tienen gran elocuencia cuando se los sabe analizar, ¿quién ignora que buques que han recibido pasaje de los litorales endemiados ó epidemiados entrando en bahía ó recibiéndolo fuera del puerto han tenido casos á bordo, en alta mar se ha propagada la enfermedad al resto del pasaje y tripulación que han sido diezmados, llevando el cólera mexicano á los puntos de escala? ¿Dónde hallar las pretensas sucesivas infecciones que dan tono al proceso cuando á muy corta distancia de las costas la pureza de la atmósfera nada deja que desear, no ya en agentes específicos patógenos, sinó hasta en saprofitos por todas partes difundidos?

En las poblaciones del interior de esta Isla, el vómito es bien sabido que no es endémico y que suelen pasarse años y años sin observarse casos hasta tanto que algún neo-isleño llega invadido de la costa. Pues bien, cuando esto ocurre, ¿qué nuevos ingresos sufre aquel organismo que sucumbe la mayoría de las veces al acto inicial de la infección? ¡Ojalá fuera cierta la pretensa influencia de las sucesivas infecciones! ¡Á cuán poca costa hubiéramos resuelto el problema terapéutico! Nada de cámaras polares, nada de medicaciones empalagosas; con aconsejar á los candidatos que al sentirse enfermos en lugar de avisar al médico, avisen á un cochero que los conduzca á Arroyo Naranjo, Calvario, Managua, etc., á un bohio en el campo, beber agua y esperar, volverían á la ciudad á los pocos días dispuestos á continuar la lucha por la existencia.

Otras de las razones en que se funda el autor de la Cámara Polar para creer en las sucesivas infecciones, es la de que la mortalidad se haya aumentado en las salas especiales de fiebre amarilla, por lo que se han desterrado de los hospitales, mas ello no puede resistir al análisis sereno de la crítica imparcial. Existen otras razones más tangibles y lógicas que explican el hecho, que no es absoluto como pretende, pues en este hospital puede cerciorarse que en las clínicas de medicina, que durante los meses del verano tienen una existencia numerosa de enfermos de la cruel endemia; no ha sido la estadística más desfavorable que la de otras clínicas del mismo establecimiento en las que sólo se han tratado los en ellas invadidos, sino que por el contrario, á pesar de incluirse en la estadística de las referidas clínicas de medicina enfermos ingresados en tercero, cuarto, quinto y hasta sexto días que lógica y científicamente no pueden ni deben figurar en conjunto, gravando la cifra obituaria de una estadística de estudio, sino desglosada por días, á pesar de ello repite, es menos

la mortalidad que en otras clínicas en que los enfermos amarillos no pasaban de dos á tres como máximum. No niega la perniciosa influencia de las clínicas especiales, mas no le asigna la causa que el Dr. García le atribuye; existen otras razones de orden psicológico que no pueden pasar desapercibidas á los clínicos que ven á diario esta clase de enfermos, otras también relacionadas con la terapéutica que dan la clave del enigma. En la época de las salas especiales de fiebre amarilla, la terapéutica carecía de base y el empirismo reinaba en todo su esplendor; sujetados unánimemente los enfermos á planes terapéuticos discordantes de la realidad patogenésica, á nadie extrañará que no influenciando el proceso favorablemente, tal vez induciendo al par profundas perturbaciones por la ciega intervención, la mortalidad fuera mayor que cuando distribuidos en las diversas clínicas de los grandes hospitales, los distintos criterios terapéuticos aportarán efectos menos desastrosos. Conoce la historia íntima de las clínicas especiales por haber sido jefe de una de ellas en su *debut* en clínica del vómito, el año 1877, influenciado por las ideas del gran clínico francés Jaccoud.

Más quiere dar por aceptable la vaga noción patogenésica que el Dr. García sienta como base de su terapéutica, y apesar de los puntos en que se ha rectificado, que aparecen en sus primeros escritos con una importancia capital, se verá á poca costa que si ilusoria es la concepción patogenésica, ilusorias son las acciones que pone en juego para combatirla, y que si algo útil puede señalarse á la Cámara Polar esta acción le pasó desapercibida, y al rectificarse le concede una importancia secundaria de restringida indicación.

El señor presidente, interrumpió al Dr. Bellver, indicando no era misión de esta junta analizar ni discutir el tratamiento del Dr. García, ni menos aún el concepto patogenésico de la fiebre amarilla; sino cumplir la orden del Excmo. Sr. Capitan General que disponía se ensayase en este hospital el tratamiento de la Cámara Polar con presencia de su autor, y por lo tanto que no podía haber discusión prévia respecto al invento del Dr. García, sino perseguir los hechos y al final de los trabajos de la comisión, vendrian las discusiones ámplias sobre las acciones terapéuticas que el autor atribuía á su procedimiento, por lo que rogaba al Sr. Bellver diese por terminada la discusión.

El Dr. Bellver significó que en su concepto esta comisión era para la investigación del tratamiento que se iba á emplear y que creía debía discutirse préviamente la acción de la Cámara Polar antes de someter á ella á ningún enfermo; máximo cuando el mismo Dr. García había autorizado la discusión, pues significó en su discurso que si había quien quisiera hacerle objeciones la admitiría gustoso para replicarlas en el acto y convencer ó ser convencido.

El Dr. Clairac dijo que abundaba en las ideas del señor presidente, y que esta discusión del tratamiento holgaba, puesto que se ordinaba por la autoridad superior emplear la Cámara Polar en los enfermos de fiebre amarilla sin pedir opinión ni dictamen previo sobre su uso; y que entendía además que la discusión sobre este tema correspondía más bien á otros centros académicos donde se presentase el tratamiento bajo su aspecto técnico; y si así se pidiese informe á la comisión, esta estaba en el caso de discutirlo, pues no sería solo el Sr. Bellver el que no aceptase las teorías del Dr. García, pues á él tampoco le satisfacían; pero que la órden que tenia la comisión era de llevar á la práctica el procedimiento é informar después de sus resultados, y por tanto que se cumplimentase lo dispuesto en las comunicaciones oficiales que se habían leído y que rogaba se volviesen á leer.

El Sr. Alonso Cuadrado emitió su opinión conforme con la presidencia y el Sr. Clairac.

Por el secretario se dió nueva lectura á las órdenes recibidas.

El Dr. Bellver dijo que en vista de lo manifestado por el señor presidente y los demás vocales cedía en el uso de la palabra, aunque creyendo que la órden de llevar

á la práctica el tratamiento no impedía la discusión teórica y deseaba se hiciese constar así su opinión en el acta.

Seguidamente se procedió á nombrar el vocal que había de tener á su cargo la clínica, siendo designado por unanimidad el Sr. Extrada, el que renunció el cargo significando que á parte de ser el que menos aptitudes reunía para el desempeño de la clínica, era el vocal más moderno y no creía además fuese atinado el nombramiento, pues público era que le unía una íntima amistad con el autor de quien era condiscípulo, aunque siempre había inspirado su criterio profesional en la imparcialidad y no dejaría ahora de hacerlo, podría suponerse por la maledicencia que nunca faltaba al juzgarse de toda experimentación, que por amistad y cariño apoyase los fundamentos del autor favoreciendo los ensayos.

Por unanimidad fué rechazada esta suposición; expresando el señor presidente que como todos los vocales habían de ver los enfermos, y el hospital militar donde se iban á hacer los ensayos contaba con un personal ilustrado que había de seguir también las observaciones, no cabían los temores que la susceptibilidad del Sr. Extrada creía ver; que además la comisión debía llamar la atención de cuantos profesores de la ciudad que quisieran presenciar el ensayo de este procedimiento pues esperaba acudirían todos cuantos cultivan con verdadero interés la ciencia médica, porque el problema de la curación de la fiebre amarilla tenía una gran trascendencia para la Isla de Cuba y para todos los pueblos americanos.

El Sr. Extrada dijo que aceptaba el cargo de jefe de la clínica, obligado por los deseos unánimes de sus compañeros, rogando que le acompañasen siempre todos los vocales de la comisión, principalmente al elegir los enfermos y diagnosticarlos.

El Dr. García significó que presentaría al día siguiente una cámara que tenía en la Habana para que pudiesen comenzar desde luego las experimentaciones, y á fin de aprovechar la estación presente en que había más casos de la enfermedad endémica, entretanto que por nuevos planos se construía otro aparato más perfeccionado que llenaría su indicación terapéutica de una manera más cumplida.

No habiendo otros asuntos de que tratar se acordó levantar acta de esta sesión, disponiendo el señor presidente se uniese á la misma la estadística presentada por el Dr. García.

ESTADÍSTICA PRESENTADA POR EL DR. GARCIA.

Enfermos tratados por la Cámara Polar en Santiago de Cuba desde el mes de setiembre de 1890, que resultaron curados.

Nombres.	Antecedentes.	Profesores que diagnosticaron.
Señor Don Ramiro Herrera y Córdova.	Canónigo de la Catedral	Dr. Guimerá.
Señor Don Pedro Herrera	Minero	Hartman, Caminero, Crós, Bisbé, Rós, Guimerá y Gimenez.
Señor Don Pedro Gabriel	Turco; edad 7 años	Ros, Grillo, Guimerá, Bisbé y Gimenez.
Señor Don Antonio Vidal	Dependiente	Bisbé, Guimerá, Crós, Grillo y Rós.
Señora Doña Rosa	Turca del Monte Libano.	Sin comprobar.
Señor Don Rufino Arguiñena	Dependiente	Crós, Rós, Guimerá y Bisbé.
Señor Don Silvestre Camp	Criado de servicio	Alvarez, Harnad, Grillo y Bisbé.
Señor Don Manuel Lopez Linares	Dependiente	Bisbé y Grillo.
Señor Don Enrique Bardina	Dependiente	Sin comprobar.
Señor Don Gaspar Compte Llopis	Dependiente	Rosillo, Bisbé y Grillo.
Señor Don Walterio Worgte	Comerciante aleman	Castillo y Bisbé.
Señor Don Maximiliano Palacios y Torres.	Dependiente	Rosillo y Grillo.
Señor Don Adolfo de Jú	Dependiente	Portuondo, Camps, Grillo y Crós.
Señor Don José María Gonzalez	Presbítero	Grillo y Camps.
Señor Don Claudio Alvarez Garcia	Dependiente	Millares y Roger.
Señor Don Emilio Viña Ratiola	Dependiente	Norma, Camps y Harnad.
Señor Don Joaquin Gargalló Silvestre	Pobre de solemnidad	Harnaz, Grillo, Norma y Camps.
Señor Don Luis Martinez	Pobre de solemnidad	Sin comprobar.
Señora Doña Dolores Rueda Martin	Pobre de solemnidad	Fernandez, Toribio, Grillo y Roger.
Señor Don Florindo Pozo Ibañez	Dependiente	Norma y Camps.
Señora Doña Lucinda Cesoia	Corista italina	Hartmant, Carbonell, Ramirez.
Señor Don Manuel Carabeli	Maquinista	Ramirez y Norma.

Enfermos tratados por la Cámara Polar en Santiago de Cuba, etc.—Continued.

Nombres.	Antecedentes.	Profesores que diagnosticaron.
Señora Doña Ramona Compte	Particular	Rós.
Señor Don Miguel Graciarena	Dependiente	Millares, Norma y Camps.
Señor Don Dionisio Canellas Carol	Idem	Sin comprobar.
Señor Don Joaquin García Gonzalez	Idem	Rossillo y Norma.
Señor Don José Camp Ferrel	Idem	Millares, Camps y Rosillo.
Señor Don Isidoro Marqués Mola	Idem	Camps y Crós.
Señor Don Fernando Gil	Idem	Camps y Millares.
Señor Don José Battle	Idem	Grillo y Camps.
Señor Don Juan Capder	Idem	Crós, Harnaz y Camps.
Señor Don Pedro Braña Vazquez	Idem	Grillo y Camps,
Señor Don Quirico, Quirol y Sagarra	Idem	Millares y Roger.
Señor Don Enrique Batalca Diaz	Idem	Millares, Norma, Camps y Roger.
Señor Don Estanislao Lopez García	Idem	Camps y Grillo.
Señor Don Pedro Cano y Fejo	Idem	Crós, Camps y Grillo.
Señor Don Mariano Planas Panillas	Idem	Crós, Arnaz, Millares y Norma.
Señor Don Emilio Garrote San Jurjo	Idem	Camps y Millares.
Señor Don Luis M. Briera	Comerciante	Sin comprobar.
Señor Don Juan Valverde	Idem	Millares, Arnaz, Roger y Camps.
Señor Don Aggusto Glasino	Aleman	Hartman.
Señora Doña Luisa Ballester de Figueroa.	Particular	Crós y Guimerá.
Señor Don Juan Laferge Carbonele	Dependiente	Camps y Norma.
Señor Don Evaristo Rodriguez Rodriguez.	Idem	Millares, Norma y Camps.
Señor Don Juan Rafol y Puig	Idem	Cros Camps, Norma y Millares.
Señor Don Bernardo Veiga Diaz	Minero	Camps, Grillo y Arnaz.
Señor Don José Dunbard	Norte-americano	Hartman.
Señor Don Francisco Gomez	Dependiente	Grillo, Roger y Arnaz.
Señor Don Rafael Costa Guerra	Idem	Norma, Millares y Arnaz.
Señor Don Antonio García Iglesias	Presbítero	Grillo, Camps y Norma.
Señor Don Francisco Gonzalez Rapado	Dependiente	Roger, Arnaz y Camps.
Señor Don Manuel Abascal Gutierrez	Idem	Norma y Camps.
Señor Don Celedonio Diaz Conejo	Idem	Grillo y Camps.
Señor Don David Gonzalez	Idem	Guimerá, Rós y Grillo.
Señor Don Salvador Cañedo	Idem	Crós, Norma, Roger y Millares.
Señor Don José Mállo	Idem	Camps, Norma y Millares.
Señor Don Antonio Blanco Feleño	Idem	Roger, Millares, Crós y Norma.
Señor Don Lorenzo Medians Casalis	Idem	Grillo y Roger.
Señor Don Enrique Fernandez San Jurjo.	Idem	Sin comprobar.
Señor Don Juan Faule Jalat	Idem	Norma y Camps.
Señor Don Clemente Bustamante Lopez.	Idem	Camps y Arnaz.
Señor Don Manuel Capdevila Lopez	Idem	Millares y Grillo.
Señor Don Jaime Alemañé*	Marino	Gonzales y Crós.
Señor Don Lorenzo Anduerza	Dependiente	Crós y Camps.
Señor Don Salvador Mestre Battle	Idem	Roger y Norma.
Señor Don Arrenio Gutierez Arcos	Idem	Camps y Arnaz.
Señor Don Tomás Alvarez Marcos	Idem	Norma, Camps, Arnaz y Millares.
Señor Don Manuel Silvestre Perez	Idem	Sin comprobar.
Señor Don José García Gándara	Presbítero	Grillo y Camps.
Señora de Don Antonio Veloso	Particular	Rosillo y Rós.
Señor Don José Pauli	Dependiente	Norma y Camps.
Sor Carolina	Señora de María	Gonzalez.
Don Francisco Lopez*	Fogonero	Guimerá y Crós.

* Estos individuos han sido enfermos de tifo-malaria.

Enfermos asistidos en la Cámara Polar que han fallecido.

Nombres.	Antecedentes.	Profesores que diagnosticaron.
Soldado N. Cuenca	Del Hospital Militar	Piñol, Bisbé y Guimerá.
Don Enrique Austich y Noncl	Particular	Piñol, Bisbé y Guimerá.
Mr. Metro Louis	Minero	Crós y Camps.
Don Ramón Rovira	Dependiente	Crós y Camps.

La anterior estadística puede desglosarse numéricamente así:

Enfermos asistidos:

Sin comprobar	7
Tifo-malaria	2
Fiebre amarilla	68
Total	77

Descartando los enfermos cuyos diagnósticos no se han comprobado y los dos casos de tifo-malaria, resultan 68 casos de fiebre amarilla tratados por la cámara polar, y habiendo 4 fallecidos, aparecen curados 64.

Acta de la Segunda Sesión.

En la ciudad de la Habana á los 23 días del mes de Agosto de 1892, reunidos en la sala de juntas del hospital militar de esta plaza, la comisión para el estudio del tratamiento de la fiebre amarilla por la Cámara Polar se dió lectura al acta de la sesión anterior que fué aprobada, pidiendo la palabra sobre la misma el Sr. Bellver, para manifestar que debía elevarse dicha acta á la superioridad antes de empezar las experiencias, pues creía que encierra verdadera gravedad el asunto, y que convenía se discerniese por quien corresponde, si había de emplearse el tratamiento sin discutirlo préviamente como opinaba la mayoría ó analizado antes como él creía.

El Sr. Clairac manifestó que no le consideraba pertinente ni de necesidad, y puesta á votación la proposición de si debía remitirse el acta al señor inspector jefe de sanidad militar, se acordó por todos menos el Sr. Bellver que no era necesaria y que se comenzasen desde luego los ensayos de Cámara Polar.

Por el señor secretario se dió lectura de un oficio del Sr. Alonso Cuadrado al que acompaña un pedido de aparatos y reactivos necesarios para los análisis de los elementos de eliminación de los enfermos asistidos en la cámara.

El señor presidente manifestó que si bien era de necesidad cuanto pedía el vocal farmacéutico para hacer un estudio completo la comisión no tenía crédito para su adquisición, y para los análisis pudiendo acudirse al laboratorio central que tenía un buen microscopio, balanza de precisión, estufas y aparatos para análisis, interesando de este centro ayúdase á la comisión, pues un pedido como el que hacía el Sr. Cuadrado no iba á ser facilitado y que si se pedía autorización para el gasto esta entorpecería la marcha de los ensayos.

Abundando en la misma idea los demás señores, se acordó pedir al laboratorio central cuanto pudiese aquel proporcionar, y recabar entretanto de la superioridad la adquisición de cuantos medios son indispensables para esta clase de estudios que va á emprender la comisión. Así mismo, se acordó interesar la pronta construcción de una Cámara Polar para el hospital militar, puesto que la que se instala es propiedad del Dr. García.

El secretario presentó un plano y proyecto de Cámara Polar, que el Dr. García había facilitado á la comisión, para que en el caso que se constituyese en el hospital militar un aparato llevase las modificaciones que el autor había pensado introducir en su invención; acordándose que la comisión se avistase con la administración del hospital para la realización de la proyectada cámara, puesto que según lo ordenado por la Capitanía General había de ser por cuenta del material de hospitales los gastos que ocasionasen los ensayos del tratamiento.

No habiendo más asuntos de que tratar se levantó la sesión.

Acta de la Tercera Sesión.

Reunidos en junta el día cinco de octubre de 1892, los señores que componen la comisión, se dió cuenta por el secretario de la marcha del Dr. Alfredo García para Santiago de Cuba, consultando como jefe de la clínica donde se verifican las experiencias de la Cámara Polar se debían continuarse aquellas ó suspender los ensayos de este tratamiento.

El Dr. Bellver expuso que no creía necesaria la presencia del Dr. García para que continuasen los estudios de la comisión, puesto que el procedimiento terapéutico era por demás conocido ya por los comisionados; reduciéndose á hacer la asepsia gastro-intestinal y meter á los enfermos dentro de la cámara.

El Sr. Lanzarot significó que se tuviese en cuenta lo que decía el oficio en que se ordenaban estas experiencias, pues creía se precisaba que se verificasen con pre-

sencia del autor y bajo sus indicaciones, por lo que era su opinión debían suspenderse los ensayos; mucho más cuando en la Cámara Polar que se estaba utilizando era propiedad del hospital militar facilitada por el inventor.

El secretario dió lectura á la parte del oficio que se citaba y constando terminantemente, dispuesto que el autor presenciase los ensayos se acordó por unanimidad suspender los trabajos clínicos hasta que el Dr. García regrese de Santiago de Cuba, ó desde allí interesase de la superioridad que la comisión continuase sus experimentaciones sin su presencia con lo que se dió por terminada la sesión.

Acta de la Cuarta Sesión.

Constituída la comisión en junta el 29 de diciembre de 1892, bajo la presidencia del médico mayor, Don José Lanzarot Herreros, el secretario dió lectura á un oficio que dice así: Dirección Subinspección de Sanidad Militar de la Isla de Cuba. Sección 1ª., número 2365. Con motivo de haber fallecido el médico mayor, Don Casimiro Roure Boffill, que ejercia el cargo de presidente de la comisión encargada de estudiar los efectos de la Cámara Polar en el tratamiento de la fiebre amarilla, he tenido por conveniente disponer se haga V. entrega del mencionado cargo en la forma reglamentaria. Lo que participo á V. para su conocimiento é inmediato cumplimiento, debiéndo significarle dé cuenta de haber efectuado dicha entrega para constancia en este centro. Dios guarde á V. muchos años. Habana, diciembre 27 de 1892. El director subinspector interino, Tomás Casas. Rubricado, Sr. Médico Mayor DonJosé Lanzarot Herreros.

Hizo uso de la palabra el señor presidente, consagrando breves y sentidas frases para lamentar la pérdida que la comisión había sufrido con la muerte del Dr. Roure, quien por sus méritos personales y científicos dejaba un vacío difícil de llenar en esta comisión así como en el cuerpo de sanidad militar donde tan valiosos servicios había prestado; significando que por su parte sentía tener que encargarse de una presidencia que sólo debía á la antigüedad de su empleo, y que rogaba á sus compañeros extremasen el empeño que todos tenían de corresponder á la ansiedad con que se esperaban las informaciones de esta comisión, por ser el problema de la fiebre amarilla de inmensa importancia en la medicina.

Por el secretario se dió lectura al siguiente oficio: Dirección Subinspección de Sanidad Militar de la Isla de Cuba. Sección 3ª, número 2362. Tan pronto quede V. hecho cargo de la presidencia de la comisión encargada de estudiar los efectos de la Cámara Polar en la fiebre amarilla, se servirá reunir la comisión con el fin de estudiar la conveniencia de emitir informe sobre las experiencias hechas en el verano pasado, dándome cuenta del acuerdo que se tome. Dios guarde á V. muchos años. Habana 27 diciembre de 1892. El director subinspector interino, Tomás Casas. Rubricado, Sr. Médico Mayor Don José Lanzarot Herreros.

Discutido por los señores de la comisión si procedía dar informe siendo tan corto el tiempo de experimentación y pocos los casos sometidos al tratamiento, habiendo faltado tantos elementos para una buena observación clínica, se acordó que una vez que el ensayo de la Cámara Polar no podía continuarse sin la presencia del Dr. Alfredo García, y que por ser también raros los casos de fiebre amarilla que ingresaban en estos meses en el hospital, no podría hasta el próximo verano continuarse la experimentación del tratamiento; el informe que al presente podía dar la comisión sólo debía considerarse en concepto de preliminar, comprendiendo las historias clínicas de los nueve casos sometidos á la acción de la Cámara Polar, para cumplir así la orden de emitir informe que parecía entreverse en el oficio de la superioridad que acababa de leerse. En tal concepto se acordó que por el Sr. Extrada, jefe de la clínica y secretario, se hiciese este trabajo, y que tan luego lo hubiese terminado lo presentase á la comisión para remitirlo á la Dirección Subinspeccion de Sanidad Militar que lo reclamaba.

El Sr. Extrada dijo: Que las historias clínicas y los demás datos de observación los tenía recogidos, pero que el informe tenía que ser por demás somero, pues nueve

casos eran muy pocos para formar juicios del tratamiento del Dr. García, que además las observaciones habían sido muy incompletas, pues la comisión no había tenido lugar en tan poco tiempo como duraron los ensayos de organizar los trabajos clínicos y de experimentación que exigía el tratamiento, por falta de recursos, careciendo de medios de experimentación y análisis, pues aunque se había acordado pedir al laboratorio central facilitase microscopio, estufas, etc., no se había realizado este propósito por las dificultades que había ofrecido, pero que prometía cumplir el mandato recibido, y haría un breve resumen de lo que se había visto en los enfermos asistidos, por más que sabía de antemano que quedarían defraudadas las esperanzas de los que creyesen iba á salir depurada la verdad científica sobre la Cámara Polar del informe que hoy diese la comisión.

No habiendo otro asunto de que tratar se dió por terminada la sesión.

Acta de laQuinta Sesión.

En la ciudad de la Habana, á los diez días del mes de mayo de mil ochocientos noventa y tres, reunidos bajo la presidencia del médico mayor, Don José Lanzarot Herreros, los señores que componen la comisión de estudio de la Cámara Polar, el señor presidente manifestó que había citado á junta para oir la lectura del informe que el vocal secretario y jefe de la clínica había redactado, según el acuerdo que se había tomado en la última sesión.

Seguidamente el Dr. Estrada dió lectura al siguiente

INFORME.

Encargado por esta comisión de redactar el informe preliminar que se acordó dirigir á la superioridad sobre el nuevo tratamiento propuesto por el Dr. Don Alfredo García y García, de Santiago de Cuba, para combatir la fiebre amarilla, abrigo el temor de no haber sabido interpretar las impresiones de todos los vocales al juzgar la Cámara Polar, y examinar los casos sometidos á nuestra observación; pero si no lo he logrado no ha sido por falta de mis mejores deseos, y á mis compañeros corresponde señalar las deficiencias que notasen, añadiendo á este informe cuanto consideren pertinente para conseguir la mayor ilustración en los conceptos y lograr que resulte completamente ajustado á la verdad de los hechos, y contribuya al esclarecimiento del asunto encomendado á nuestra observación y estudio.

No creo de nuestra incumbencia analizar el tratamiento del Dr. García por sólo las ideas que expresó ante esta comisión el primer día que nos hemos reunido, pues aquella exposición no constituye un cuerpo de doctrina completo, ni en tal concepto creo las expuso el autor; sino ligeras indicaciones para darnos á conocer, antes del *modus operandi*, lo que le había impulsado á emplear el frío como agente terapéutico, y hecho concebir ideas favorables de su aparato Cámara Polar que creyó ver confirmado en su práctica. Pero aún sin entrar en la crítica científica del tratamiento que nosotros debíamos emplear según las órdenes recibidas de nuestro jefe superior, considero del caso recordar que el uso del frío como tratamiento de la fiebre amarilla no es asunto nuevo, como no lo es tampoco la terapéutica *á frigore*.

Impidiendo el frío la descomposición de la materia orgánica, desde remotos tiempos se hizo la aplicación de este agente á la conservación de los alimentos, así como á la de los cadáveres; siendo de todos conocido el procedimiento seguido modernamente en los anfiteatros anatómicos de Alemania, perfeccionado hace pocos años por Mr. Brouardel en la Morgue de Paris.

Las experiencias fisiológicas de varios autores han confirmado lo que desde hace muchos años se sabía sobre la acción del frío, y su influencia en el desarrollo de las fermentaciones, lo mismo que en las enfermedades infecciosas. Tedenat, en su estudio sobre la neutralización de los virus, cita el hecho de haber inoculado varias ranas con sangre septecémica, y colocando unas en agua caliente, al sol á 20° ó 25° centígrados, y otras en agua enfriada con hielo á 8° ó 10°, comprobó como resultado

que las primeras murieron á las 24 horas y las últimas sobrevivieron muchos días á la inoculación. Dabaine demostró también en 1879, ante la Academia de Paris, la influencia de la elevación de la temperatura en la inoculación de los venenos sépticos.

Todas las experiencias fisiológicas que pudieramos recordar lo que comprueban es que el frío puede paralizar las manifestaciones de la vida en los seres animados, pero no destruirla. Los huevecillos del *bombix-morœ* necesitan de temperatura elevada para metamorfosearse en gusano de seda; pudiendo conservarse dicha semilla sin alteración más de dos años cuando la temperatura es inferior á la de su natural incubación.

Esta suspensión de la vida, esta resistencia al frío está en relación con la mayor simplicidad de los organismos, así la levadura de cerveza resiste aún al descenso de temperatura producido por la solidificación del gas ácido carbónico, y este mismo procedimiento aseguró á Frisch de la resistencia de los microbios y bacterias, inoculando diversos líquidos sépticos, los que despues del deshielo conservaban su virulencia igualmente activa. Aún más concluyentes sobre este particular son los experimentos del gran Pasteur al aprovechar el riguroso frío del invierno de 1879 á 1880, comprobando que al cesar el frío, en la primavera siguiente, recobraban su actividad los líquidos de cultivo y las siembras en que se había paralizado la vida. El hecho citado por Gluber y Bordier de la neutralización del virus baccinal sometido por Melsens á un frío de menos 80° centígrados á cuya temperatura dicen pierde su virulencia, no está comprobado suficientemente.

Anotamos estas observaciones no sólo para apartar la idea de la influencia absoluta del frío en el desarrollo del micro-organismo que suponemos determina las lesiones del proceso amarillo, sobre cuyo particular estamos todos conformes con lo que expuso nuestro compañero el Dr. Bellver en nuestra primera sesión, sino para combatir también esta influencia absoluta que en el desarrollo de la fiebre amarilla quiere concederse á la temperatura de nuestro clima. Conocemos el ejemplo de la barca americana que al Dr. García hizo vislumbrar la idea de aplicar el frío en el tratamiento de la endemia. Otros muchos casos análogos y recientes podríamos citar de los buques de nuestra marina, como por ejemplo el de la fragata *Concepción* que salió epidemiada de este puerto en el mes de junio de 1884, ocurriendo bastantes casos de nuevas invasiones en alta mar, y cesando la fiebre amarilla al llegar á latitudes superiores, ofreciéndose además el curioso hecho no explicado de ser excesivamente mayor el número de invadidos de la banda de babor que de la de estribor, y si en alta mar podría haber influido la dirección de los vientos para que esto sucediese, dentro de esta bahía no se puede buscar igual explicación á este hecho.

Lo ocurrido con el vapor *Plymouth* de la marina de los Estados Unidos en 1878 también nos es bien conocido, pues ha servido para deshechar la idea de que el frío obre como desinfectante. Pero, ¿á qué citar sucesos recientes? Recordemos que á bordo de la *Gloriole* se desarrolló la fiebre amarilla el 7 de agosto de 1821, según refiere Kérandren, estando el buque á los 46° de latitud y habiendo descendido el termómetro aquel día de una manera notable. Lo mismo sucedió en la *Urca Farn*, en la rada de San Pedro Miquelón, á los 47° 30′.

Estos casos y otros anteriores hicieron deshechar la creencia que existía á fines del pasado siglo de que la fiebre amarilla tenía sus límites fijos de los 25° de latitud sur á los 35° de latitud norte, y que ya en 1817 la academia de Paris fijase los 48° al norte como límite de la enfermedad, estando hoy casi todos los autores conformes con lo dicho por Dutroulan, de que no es posible fijar un límite á esta terrible enfermedad, pues existe algo más que la latitud como influencia en su desarrollo epidémicamente, aunque sus focos primitivos correspondan al seno mexicano, donde es mi opinión particular, existía antes del descubrimiento de América, según lo afirma nuestro amigo, el ilustrado Dr. Finlay, que vé hoy corroborados sus asertos con la valiosa carta del sabio obispo de Yucatán, en la que confirma esta opinión por el estudio de los códigos Mayas y manuscritos indios que posee.

Si sólo la temperatura influyese en el desarrollo de la fiebre amarilla, no se hubieran dejado sentir los efectos de la epidemia en los climas fríos, y como dice Hillary, que estudió la enfermedad en las Barbadas en 1759: "Despues de las minuciosas observaciones que vengo haciendo muchos años ha sobre las variaciones de la temperatura é influencia de las estaciones, no creo que esta fiebre sea causada ni modificada por ellas, puesto que yo la he visto en todo tiempo, en todas las estaciones del año, con grandes fríos lo mismo que con fuertes calores."

Nuestro ilustrado Arejula, que tan perfectamente describió las epidemías de fiebre amarilla de Cádiz y sus pueblos comarcanos en 1800, la de Medinasidonia en 1801, y la de Málaga y Cádiz en 1803, que se extendió hasta nuestra fría región de la Mancha, fijo su atención en las variaciones de temperatura, verificando notables observaciones meteorológicas, diciendo terminantemente: "Es una arbitrariedad atribuir la epidemía que padecimos en Cádiz á la alta temperatura."

Bahilly y Pariset que estudiaron la epidemía de Barcelona de 1821, que se estendió por otros puntos del litoral, confirman lo mismo, pues precisamente aquel año fué más baja la temperatura que en los anteriores. Lo mismo resulta de las observaciones de Mellado en la segunda epidemia de Cádiz de 1810; del Louis, que con Trousseau y Cherin, fueron á estudiar la de Gibraltar en 1826; del gran clínico Graves, que asistió la de Dublin de 1826 á 1827; de Pinto, Albarenga y Coutincho, que nos da á conocer la de Lisboa desarrollada en setiembre de 1857 al empezar los fríos; de Dowler, que observó la fiebre amarilla de la Louisiana en 1853, donde a pesar de caer escarcha en abundancia, no se modificó la marcha de la epidemía; de Fenner, que en el mismo año, dice, heló copiosamente el 31 de octubre en Nueva Orleans y sin embargo siguió la epidemia hasta el mes de noviembre, siendo lo mismo que observó Blair en la Guallana en 1852, donde la epidemia empezó con una baja de temperatura á 19°; sucediendo lo mismo en Saint-Nazaire, cuando en 1861 fué importada por el buque Ana María; como en Canarias en las epidemías de 1701 y 1810, y en las de 1862 á 1863, llevada por la fragata, *Nivaría* que estudiaron los Dres. Busto y Landa de sanidad militar.

En fin así resulta de nuestras propias observaciones, pues es bien sabido que el vómito presenta casos más graves en el invierno que en el verano, pudiendo citar los cuadros estadísticos de mortalidad de este mismo hospital, por los que se vé que en algunos años, aunque raros, no aparecen defunciones y algún año ni atacados en meses de fuerte calor como mayo y junio, y en cambio no faltan en ninguno de los meses de invierno, viendo esto mismo confirmado en una estadística de un decenio del hospital de Veracruz que tomé en unión de nuestro compañero el Dr. Pizarro y Raillo, cuando en 1884 hicimos una excursión por la República mexicana.

En nuestro concepto pues, las bajas temperaturas no influyen por sí solas para el desarrollo de la fiebre amarilla, lo que por otra parte no quiere decir que el frío deje de ser un importante agente terapéutico que pueda tener su aplicación al tratamiento de la enfermedad endémica.

He dicho antes que el uso del frío en la fiebre amarilla no era nuevo, y preciso es que compruebe este aserto con algunos datos que si bien son conocidos, bueno es recordarlos para lo que más adelante he de decir respecto á la Cámara Polar del Dr. García.

En 186- cuando vinieron á Cuba los profesores Masnatta y Fraschieri, que fueron autorizados para ensayar en este mismo hospital las inoculaciones del rocío tropical, empleaban también el frío como tratamiento, colocando grandes bloques de hielo en la sala especial que se les destinó (local que hoy ocupa la sala 1ª de marina) distribuyéndolos á lo largo de las paredes, por debajo y al rededor del catre del enfermo, circundándolo, en fin, de una atmósfera fría, saturada consiguientemente de humedad, pues el deshielo se verificaba dentro de la sala. Aún existen empleados en el servicio de este establecimiento, practicantes de aquella época, que recuerdan dichas experiencias si bien aseguran que el resultado fué poco satisfactorio. Nosotros no tenemos noticias por los anales científicos de la bondad del sistema de dichos médi-

cos, no habiendo encontrado en los archivos de sanidad militar más datos que varias relaciones de enfermos sometidos al procedimiento, pero sin estadísticas de su éxito. Tampoco conocemos la descripción del *aparato catastático* * con que aquellos profesores nombraron al medio terapéutico empleado y para cuyo uso se les autorizó

En 1869 el Dr. Laurence Bablot, de la Universidad de Pensilvania, vino á la Habana con la idea de aplicar también el frío en la fiebre amarilla, presentando á la academia de ciencias una memoria titulada: "Ensayo sobre una nueva teoría químico fisiológica de la fiebre amarilla endémica en las Antillas," y como segunda parte de este trabajo entregó en el mismo año á la referida corporación otra memoria cuyo título era del "tratamiento curativo racional de la fiebre amarilla endemica" consistiendo este en proporcionar al enfermo una atmosfera artificial de aire seco y frío que por su estado higrométrico, su temperatura, la cantidad de oxígeno que encierre y hasta por el estado eléctrico que se le pueda comunicar, reuna la mayor pureza y sustituya á las malas condiciones que rodean al enfermo.

Estos trabajos y la crítica científica y razonada que mereció del ilustrado Dr. Don Joaquin G. Lebredo encargado de su informe pueden verse en los tomos de los Anales de la Academia de ciencias de la Habana.

Para conseguir colocar al enfermo en tales condiciones admosféricas, ideó el Dr. Bablot un aparato especial que la corporación científica, ante la que expuso sus doctrinas, consideró de difícil disposición, si bien manifestó sus simpatías al autor alentándole en la vía de las experimentaciones. Según las pocas noticias que hemos podido adquirir se hicieron algunos ensayos del aparato de Mr. Bablot que era una especie de tienda de campaña de lona impermeable, en la quinta de salud de San Leopoldo que hoy no existe, creyendo que el resultado fué negativo pues apenas dejó resonancia entre nosotros este tratamiento; sin que hayamos podido encontrar datos clínicos ni estadísticos, sabiendo solo que el Dr. Bablot se ausentó de la Isla trasladándose á Puerto Rico y Santo Domingo donde no sabemos si realizó más experimentaciones, ni si fué debido á él que en Jamaica hace algunos años se verificase también la aplicacion del frío á los enfermos de fiebre amarilla de la escuadra inglesa por medio de los *ice bags*.

Gamgée de Londres opinando que el germen del vómito era un parásito y que el frío excesivo debía ser un sencillo medio de destruirlo, dió lugar á que sostuvieran esta teoría el Dr. A. Gibbon y el professor Richardson de Filadelfia en el congreso de Richmond, verificado en noviembre de 1878. Consecuencia de las conferencias de Gamgée el citado congreso votó un millón de pesos para la construcción de un barco frigorífico, habiendo una generosa dama que filantrópicamente ofreció una gran parte de su fortuna con igual objeto. Dicho buque de vapor, provisto de poderosos aparatos refrigerantes, estaba destinado á estacionarse en Nueva Orleans, sirviendo para inyectar en los barcos donde hubiese epidemiados, y por medio de mangas ventiladoras y de bombas enormes cantidades de aire á 18°, pudiendo bajarse la temperatura hasta 23° y sanear así la atmósfera de las bodegas y sentinas; no siendo coronado por el éxito este costoso experimento.

Acariciaron también por esta época la aplicación del frío al tratamiento de la fiebre amarilla algunos compañeros nuestros de sanidad militar. El Dr. Casimiro Roure, presidente de esta comisión, cuya sensible pérdida acabamos de experimentar, en unión del médico mayor Sr. Herandez Buchó, además de usar las sábanas y los baños fríos, y colocar hielo bajo el catre de los enfermos iniciados en el procedimiento de Mr. Bablot con quien Roure mantuvo buena amistad durante su perma-

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* *Catastático*, adjetivo que se emplea en medicina para calificar las enfermedades que son efecto de la influencia húmeda y fría de la atmósfera. Es palabra científica formada sobre la base de la voz griega *katastasis*, de . . . (en) y . . . (la acción de poner) y de la terminación *ico*, que suele emplearse en voces genéricas.

También pudiera creerse que los citados médicos han usado la palabra catástatica para definir enfermedades debidas á la influencia del aire, tomando el adjetivo de la voz griega *katastema*.

Hacemos indicación de estas voces por no conocer el aparato que dichos Sres. Masnatta y Fraschieri emplearon.

nencia en la Habana, idearon algo análogo. Fundábanse especialmente en que el proceso destructor del globulo rojo constituye uno de los elementos patológicos esenciales de la enfermedad y que debía procurarse por todos los medios impedir esta microcitemia rubra, encontrando desde luego como indicación más apropiada activar la hematosis por medio de la oxigenación mezclada al aire esterilizado á altas temperaturas. Hernandez Buchó más entusiasta de esta idea discurrió al efecto el aparato siguiente: Un cuarto perfectamente impermeable y revestido de una capa densa de silicato de potasa tanto interior como exteriormente, que impidiese no absoluto la mezcla del aire exterior con el compuesto artificial que debía respirar el enfermo, prévia una cubicación grande para que no pudiera enrarecerse; para ello alimentaban esta habitación por medio de dos gasómetros de capacidad suficiente que uno contuviese aire esterilizado, y el otro oxígeno purificado, y cuyos conductos aferentes estaban graduados para hacer penetrar en la habitación aire y oxígeno en las proporciones variadas que aconsejasen la mayor ó minor dilución de la sangre según el período de la fiebre amarilla. En este procedimiento veían los autores la ventaja además de que el aire y el oxígeno préviamente esterilizados se enfriaban por medio de serpentines que correrían en un depósito de hielo á la temperatura de 10° á 15°, cuya temperatura debería sostenerse en la habitación del enfermo por tanteos prácticos; pudiendo á la vez hacer las proporciones de la mezcla tan variadas como se quisiesen, así como la presión atmosférica interior que por presión en los gasométros podría llevarse á una, una y media ó dos según que se quisiese ingerir en el pulmon mayor ó menor cantidad de la referida mezcla. Como complemento habría dentro de la habitación vasijas con agua de cal, con el fin de saturar el ácido carbónico espirado; termómetros, barómetros, hidróscopos y demás medios de observación para las que se necesitasen hacer sin tener que penetrar en la habitación del enfermo que tendría algunos cristales al efecto. Por otra parte dicho edificio, con el fin de aislarlo de las corrientes eléctricas cuya influencia perniciosa está demostrada, debería estar montado sobre soportes de cristal. Al exterior habría una bomba de aspiración para en un momento determinado hacer la extracción de la mezcla aerea empleada, y renovala de una manera activa sin necesidad de abrir las puertas.

Roure y Hernandez Buchó hablaron de la cuestión é iniciaron en sus planes al ilustrado ingeniero militar, hoy General de Brigada Excmo. Sr. Don Rafael Cerero, cuando este señor era jefe de la comandancia de ingenieros de esta plaza, formulando un proyecto para construir en este hospital dicha habitación refrigeradora, en las condiciones que sus inventores deseaban; pero dicho proyecto no fué viable porque el gasto que exigía montaba á unos cuantos miles de pesos y su coste pareció excesivo, para vía de ensayo, al Capitan General de la Isla que era entonces el Excmo. Sr. Don Joaquin Jovellar.

También en la casa de salud "Quinta del Rey" se intentó el tratamiento por el frío en los enfermos de fiebre amarilla por el catedrático de esta universidad, Dr. Bango, en unión del Dr. Espada en 1884 y 1885, según manifiesta aquel profesor en su discurso de apertura del actual año académico, sin obtener éxito lisonjero, siendo el sistema empleado semejante al de los *ice bags* usados en Jamaica; pues según nuestras noticias los enfermos eran metidos dentro de una especie de traje impermeable lleno de hielo ó agua helada.

Hasta aquí lo que podemos llamar historia del frío en sus aplicaciones á la terapéutica de la fiebre amarilla, que he detallado quizas más de lo debido para venir á la Cámara Polar del Dr. García, invento más reciente, pues data su aplicación de hace tres ó cuatro años, y que si bien está basada en el uso del hielo para bajar la temperatura, difiere, á nuestro modo de ver, en su teoría y práctica de cuanto hasta aquí se ha hecho con el frío en la fiebre amarilla. Sólo vemos alguna semejanza con el aparato de Mr. Bablot, pero algo remota, pues á parte de la diferencia en los materiales de construcción entre la cámara de García y la tienda de Bablot, éste pretendía emplear el aire seco y frío saturado de oxígeno y electrizado; y en el

moderno procedimiento al enfermo se le quiere colocar en un aire aseptico, húmedo y frío en que se respira más oxígeno, es por la renovación constante del medio ambiente. Creemos que la cuestión no es la misma, y que la acción fisiológica del aire dentro de la Cámara Polar tiene que ser muy distinta de la que se experimente por cualquiera de los medios propuestos ó ensayados en las anteriores aplicaciones del hielo en la enfermedad que nos ocupa.

Pero he sentado ántes que no creía de la incumbencia de esta comisión analizar el tratamiento del Dr. García á priore, juzgando sin experimentación de las modificaciones fisio-patológicas que el autor pretende haber encontrado en la Cámara Polar, y sus ventajas terapéuticas; así que parece desde luego á exponer las observaciones que hemos verificado en el poco tiempo que funciona entre nosotros este aparato.

Comisionado por mis compañeros para llevar la observación clínica de los enfermos de fiebre amarilla sometidos al tratamiento de la Cámara Polar, cumpliría suficientemente mi cometido presentando hoy á su consideración las historias clínicas de los pocos casos que han ingresado en esta sala especial, cuyos documentos he procurado llevar con toda escrupulosidad por lo que hace á consignar minuciosamente la sintomatología y modificaciones que he podido apreciar en los enfermos, así como he anotado cuantas indicaciones terapéuticas, farmacológicas y dietíticas dispuso el autor del procedimiento; pues debo significar que el tratamiento seguido con los enfermos ha sido siempre y en todos los casos dispuesto por el Dr. García, sin que ninguna prescripción fuese dictada por nosotros, limitándonos, como era nuestro deber, á observar los hechos según nos había ordenado.

Bastaría pues, como digo, recordar hoy á la comisión los enfermos que hemos visto, pues todos los vocales han seguido las observaciones al mismo tiempo que el jefe de la clínica, de la misma manera que han podido seguirlos también cuantos profesores del cuerpo de sanidad militar y de la armada y los civiles de la capital hubiesen querido venir á ver los enfermos á este hospital, cuyas puertas han estado siempre abiertas á los hombres de ciencia para sus estudios y experimentaciones. Con verdadera gratitud cito los nombres de los Drs. Tamayo, Finlay, Delgado, Santos Fernandez, Martinez, Grande, Altayó, Ossuna, Zugaste, Diago, Espada, Dueñas, Laguardia y muy particularmente del Dr. Semprun, cuyos profesores han concurrido á este hospital diferentes veces á ver nuestros enfermos y juzgar por sí mismos del tratamiento.

Expondré con la mayor sencillez las historias clínicas, haciendo despues ligeras consideraciones respecto á cada caso en particular á fin de establecer algunas deducciones en este trabajo, que en concepto de informe preliminar se ha acordado elevar á la superior autoridad del Excmo. Sr. Capitán General de la Isla, que con gran alteza de miras ordenó se verificasen estas experiencias, por cuya generosa protección en un asunto científico se ha hecho acreedor á la más alta consideración de la ciencia médica.

Pocos en verdad han sido los enfermos sometidos al tratamiento del Dr. García, pues necesitando en primer lugar la garantía de un diagnóstico preciso hecho por la comisión, este no puede fijarse siempre en las primeras horas de ingreso en el hospital; y exigiendo el autor que los enfermos entren en la cámara dentro del período de las primeras 24 horas y hecha ya la asepsia gastro-intestinal, no ha sido posible muchas veces compaginar ámbas exigencias. Por otra parte la orden que recibió esta comisión disponía se verificasen las observaciones con presencia del Dr. García; y su permanencia entre nosotros fué breve, teniendo que suspender el estudio con sólo 9 casos, exiguo número de enfermos que no permiten formular conclusión alguna definitiva, pues la premura del tiempo nos impidió organizar en forma conveniente los trabajos clínicos experimentales necesarios para que el resultado de la observación fuese completo; sin poder hacer comparaciones de este tratamiento con otros seguidos en nuestras clínicas.

Veamos por orden correlativo las historias de los 9 enfermos que ingresaron en la Cámara Polar:

Primera observación.—Ramón Gimenez Perez, guardia 2ª de la 2ª compañía del cuerpo de Orden Público, hijo de José y de Sebastiana, natural de Guia (Islas Canarias), de 25 años de edad, oficio labrador, prófugo del año de 1887, empezó á servir en el año de 1890. Es de constitución activa, temperamento sanguineo, sin idiosincracia conocida, de aspecto sano y robusto.

Ingresó en el hospital en la sala de cirugía el día 17 de agosto, por la tarde, presentando una pequeña úlcera simple en la región malealar externa del lado izquierdo con edema de la pierna. Se le dispusieron fricciones con pomada mercurial y cura simple.

Á la 1 de la tarde del día 21 sintió un escalofrío seguido de malestar general, cefalalgia, fiebre alta, dolores en las extremidades y en la región lumbar por lo que fué trasladado á la sala 2ª de medicina disponiéndosele un purgante salino.

Día 22 de agosto: En la visita de hoy presentaba fiebre con 39.5° décimos de temperatura, 104 pulsaciones, cefalalgia supraorbitaria, raquialgia, lengua saburrosa, encendida en los bordes, encías congestionadas, no hay hepigastralgia ni vómitos, evacuaciones producidas por el purgante, orina varias veces durante la noche. Se le dispuso naftol, dos gramos, y benzoato de sosa un gramo para seis cápsulas, tomando una cada dos horas.

En la tarde de este día presenta 40.5° de temperatura, pulso lento y blando, la cefalalgia es muy intensa con gran congestión de las conjuntivas oculares, turgencia de la piel, color violaceo de las encías, epistaxis del lado izquierdo, congestión pasiva de ámbos pulmones, alguna tós. Por la auscultación se aprecian síntomas de hiperemia pasiva pulmonar en el lado izquierdo. Orina unos 200 gramos de reacción ácida y por el reactivo de Esbach se aprecia la albúmina en pequeña cantidad.

Examinado el enfermo por la comisión de fiebre amarilla y conformes todos en que se trata de un caso de fiebre amarilla grave, previa discusión con el Dr. García, entra en la Cámara Polar á las 7 y 25 minutos de la noche, disponiéndosele una hora antes 300 gramos de limonada, purgante de citrato de magnesia y 2 enemas de sulfato de sosa.

Á las 9 de la noche tenía 40.1° décima de temperatura y 90 pulsaciones, á la 1½ de la noche se le dispuso otro purgante de 300 gramos de citrato de magnesia para tomar en dos veces. Durante la noche hizo tres deposiciones: la 1ª á las 2½, excrementicia; la 2ª á las 3, abundante y serosa, y la 3ª á las 4 y 45 minutos, ligeramente oscura de reacción neutra. Orinó á esta hora 50 gramos, presentando bastante albúmina apreciable por el calor y el ácido nítrico.

Día 23: A las 7 de la mañana temperatura 39.6°, pulso 80, no hay raquialgia, el enfermo acusa bienestar general, ligera cefalalgia, gravativa, pero menos que ayer; no hay tos.

Á las 11 y 25 hizo una deposición corta y oscura orinando 250 gramos con bastante albúmina. Á las 12¼ tuvo otra deposición de color oscuro verdoso y de olor fétido. Á las 1½ se le dispuso otro purgante de citrato de magnesia para tomar en dos veces. Á las 2 y 10 minutos hizo otra deposición más clara que las anteriores, pero de gran fetidez, orinando 60 gramos. Pulso deprimido.

A las 4 de la tarde hizo una deposición más clara que las anteriores, de reacción neutra, recogiéndose 40 gramos de orina presentando albumina en abundancia. Temperatura 38.2°, pulsaciones 80, estando el pulso más desenvuelto. No hay epigastralgia ni acusa más que ligera cefalalgia. Á las 5 de la tarde orinó 20 gramos con menos albúmina. Á las 7 hizo una deposición como las anteriores y orinó 40 gramos.

La cantidad total de orina emitida en las 24 horas que lleva dentro de la cámara es de 460 gramos y hecha la investigación aparece que es de consistencia espesa, color No. 3 de la escala de Vogel, aspecto turbio, sedimento coaguloso, olor fuerte, reacción ácida, gravedad específica 1′ 0.19, la cantidad de urea es de 20′ ′2 presentando por litro 1′20.

Á las 9 de la noche, temperatura 38.5°; pulso, 80 y más fuerte; el enfermo dice que siente sueño y algún apetito, la lengua más limpia, no hay náuseas ni epigastralgia.

Á las 12 de la noche se presentan náuseas, arrojando en el suelo un pequeño vómito en cantidad como dos cucharadas de líquido que no pudo reconocerse. Á los 5 minutos hizo otra deposición como las anteriores de olor fétido, orinó 40 gramos que analizada resultó de reacción alcalina con abundancia de carbonatos conteniendo albúmina además. A la 1 de la madrugada tuvo náuseas que siguieron hasta las 3 y 45 que vomitó, llenando una escupidera de líquido claro. Hizo una deposición, intentando hacer otras, pero en pequeñísima cantidad, tenesmo rectal. A las 4 y 30 tuvo otro vómito con pequeñas partículas á manera de alas de mosca. Á las 7 y 30 tomó cuatro cucharadas de leche helada.

Día 24: A las 9 y 30 de la mañana, temperatura 37°, el pulso ámplio y algo duro con 80 pulsaciones. Las deposiciones de la noche anterior son alcalinas, los vómitos ácidos y la orina alcalina, dando bastante albúmina. Á las 10 tuvo hipo y orripilaciones bajando la temperatura á 36° y 9′, el pulso deprimido; se le dispuso una

poción tónica según la fórmula de Jaccoud, comenzando tomarla en seguida á cucharadas, una cada media hora.

Por disposición del autor se empezó á descargar el hielo de la cámara. A las 11 y 30 la temperatura subió á 37.5° aquejando epigastralgía. Á las 12 tomó una cucharada de una solución compuesta de cafeina, 1 gramo, y poción gomosa, 120 gramos.

Á la 1 y 30 salió de la Cámara l'olar habiendo sido gradual la temperatura interior que se estableció dentro de la misma hasta llegar próximamente á la de la habitación en que se le colocó.

Á las 2 la temperatura era 38.1°, 88 pulsaciones, siendo el pulso pequeño y deprimido. Á las 2 y 30 hizo una corta deposición muco-biliosa, aquejando fuerte epigastralgía. Á las 2 y 45 se le dió una copa de leche fría. Á las 3 se comprobó existía líquido en la vejiga y como llevaba algunas horas sin orinar, se le extrajeron por la sonda 63 gramos de orina ácida y albuminosa.

Á las 5 y 30 la temperatura era 38.5°, pulsaciones 92, el pulso blando y depresible, soñolencia, algo de perturbación en la inteligencia, tardío en contestar, la epigastralgia acentuada, lengua húmeda y flogoseada, tinte subictérico de la piel, hipo, sigue tomando la poción tónica alternando con la cafeina, poniéndole paños helados á la región epigástrica. Á las 6 y 45 se le sondó y expulsó 10 gramos de orina, el hipo va en aumento, vomitando á las 8 de la noche 60 gramos de líquido borroso haciendo una deposición á las 8 y 15 con abundante borra.

El Dr. García dispuso que el enfermo volviese á entrar dentro del aparato, lo que se verificó á las 9 de la noche, comenzando á bajar la temperatura interior de la cámara hasta 10° centígrados. Á las 10 el enfermo tomó 90 gramos de leche fría, la temperatura era 38.6° y 84 pulsaciones, pulso desenvuelto. A las 10 y 45 se le puso un enema de sulfato de sosa haciendo una deposición excrementicia; se repitió el enema más tarde haciendo otra deposición abundante y oscura. Durante la noche siguió tomando leche alternando con la poción tónica. Á las 2 y 30 de la madrugada orinó 30 gramos de orina albuminosa, sigue el hipo y los vómitos. Á las 6 y 45 le dispuso 250 gramos de agua Apolinaris, la temperatura es de 37 con 7, y 88 pulsaciones.

Día 25: Á las 9 y 30 la misma temperatura anotada antes, el pulso blando y pequeño, la lengua roja, ancha y húmeda, fuerte epigastralgia, frequente el hipo, comenzando el delirio. Á la 1 y 25 hace una deposición borrosa característica, vómitos claros manchados de borra, aumenta el delirio, movimientos convulsivos, pérdida completa del conocimiento, estado atáxico, siguiendo los vómitos de borra y el hipo muy molesto, continuando en esta situación hasta las 5 de la tarde que se presentaron los fenómenos preagónicos, falleciendo á las 7 y 30 minutos.

Autopsia practicada 10 horas después. Abierta la cavidad torácica se encuentra reforzada por numerosos tractos fibrosos la hoja parietal del pericardio, y en la cavidad de este, como 2 onzas de líquido. Nada digno de mención en las pleuras, y en la base de ámbos pulmones congestión más intensa del lado izquierdo en el que la hiperemia se basa los límites del lóbulo medio. Por parte del corazón su apariencia es la de aquellas cuya fibra muscular ha pasado por un proceso lento de evolución regresiva, tal como suele verse en los individuos atacados de insuficiencia cardiaca, el órgano sin traspasar ni exceder las dimensiones normales tiene sus paredes flácidas y exangües, y al corte del bisturi se rezuma una serosidad, en que están inhibidas sus fibras; el color es de un rosado sucio.

El endocardio está enfiltrado en su totalidad y en ciertos puntos equimosado y reblandecido; al nivel de los orificios valvulares tiene un aspecto gelatinoso; las conexiones de las válvulas con las columnas carnosas se han perdido por completo en medio de esta especie de putrilago.

Realmente parece que este enfermo ha sucumbido á una endocarditis infecciosa.

En los demás órganos no ofrece diferencia apreciable de lo que suele verse en las autopsias de fiebre amarilla.

Segunda observación.—José Solis Casellas, soldado de la 4ª compañía del regimiento infantería de Cuba, hijo de Isidoro y de Francisca, natural de Pineda (Barcelona), de 24 años, empezó á servir como quinto el día 30 de noviembre de 1887, de constitución pasiva, temperamento linfático nervioso; estuvo en este hospital una vez con calentura intermitente, otra con venereo y otra vez con una inflamación.

El día 27 á las 4 de la tarde, estando haciendo el servicio de centinela en el castillo del príncipe, se sintió enfermo con un escalofrío y malestar general, teniendo que ser relevado de su servicio é ingresando en el hospital á las 10 de la noche, presentando fiebre alta, dolores generales, cefalalgia gravativa y lengua saburrosa; disponiéndole el profesor de guardia un purgante de sulfato de sosa.

Día 28: Á las 8 de la mañana aquejaba intensa cefalalgia, epigastralgia y raquialgia; lengua encendida en los bordes y blanquecina en el centro, encías congestionadas, marcándose la línea ginjibal, labios violaceos; temperatura 38.2°, 88 pulsaciones con pulso lleno é inyección de las conjuntivas. Se le dispuso un purgante de citrato de magnesia y dos enemas de sulfato de sosa en cantidad de 50 gramos de sal para cada una. Á las 10 y 40 hizo una deposición escrementicia.

Entró en la Cámara Polar este enfermo á la 1 y 15, estando el aparato á 15° centígrados y siguiendo en baja la temperatura interior. Á la 1 y 30 tenía temperatura 37° con 7. A las 4 y 10 minutos hizo una deposición clara de color amarillento y olor fétido, orinando 125 gramos de líquido con 1034 de densidad sin albumina y de reacción ácida; el pulso es blando, intermitente con 88 pulsaciones, siendo la temperatura 37.8°.

Á las 5 y 25 se le puso otro enema con 25 gramos de sulfato de sosa.

Á las 6 y 30 la temperatura había bajado á 37° con 5 y las pulsaciones eran 70.

A las 9 y 20 hizo una deposición de carácter bilioso. A las 11 tomó un purgante de sulfato de sosa que le hizo operar en la misma forma que la anterior.

A las 6 de la mañana siguiente, orinó 60 gramos sin presentar albumina y sí, abundancia de fosfato.

Día 29: Á las 9 de la mañana, temperatura 36° 2, no aqueja más que ligera cefalalgia y epigastralgia; 44 pulsaciones con pulso lento y depresible; se le administró la poción tónica de Jaccoud para tomar á cucharadas, tomando antes de esta 15 gramos de ginebra aguada.

Á las 11 tomó 150 gramos de leche.

Á las 12 y 30 orinó 255 gramos de orina trasparente de escasa densidad, siguiendo alternando la jinebra aguada con la poción tónica de hora en hora.

Á las 3 y 30 orinó 150 gramos de líquido ambarino, ligeramente ácido, con 10.25 de densidad; la temperatura 36° 5, 48 pulsaciones, pulso más fuerte, semblante animado, lengua húmeda, algo blanquecina, labios pálidos, encías algo congestionadas, no aqueja ningún dolor; el vientre flácido y dice hallarse muy bien pidiendo de comer.

Á las 4 y 30 tomó leche disponiendo que alternase cada dos horas la leche con una poción alcohólica á base de rom.

Á las 6 orinó 200 gramos de orina igual á la anterior haciendo, una deposición ligeramente amarilla.

Día 30: Á las 9 y 45 el pulso muy deprimido, 44 pulsaciones con temperatura en la axila de 35° 5 y en la boca 35° 6; lengua húmida, ligeramente blanquecina en el fondo; encías rosadas; no aqueja ningún dolor ni molestia, expresando se encuentra muy bien. La temperatura interior de la cámara es de 13° centígrados.

Á las 10 y 30 tomó 15 gramos de jinebra aguada.

Á las 11 se le dispuso un enema de agua fría haciendo á poco tiempo una deposición y orinó 125 gramos.

Á las 4 de la tarde volvió orinar 125 gramos con densidad 10.25, la temperatura en la boca es de 35° y en el ano 36°. Tiene 36 pulsaciones siendo el pulso muy lento y deprimido. Se le ordenó caldo y jerez alternando con leche disponiéndose descargar la cámara de la que salió á las 9 de la noche.

A las 9 y 25 el pulso está algo más levantado, 48 pulsaciones; en la axila tiene 35° 8 de temperatura. Sigue la misma alimentación durante la noche.

Día 31: Á las 8 de la mañana orinó 235 gramos; se le puso un enema de agua fría é hizo una deposición biliosa.

Á las 9 y 30 pulso blando, 48 pulsaciones, temperatura 36° 4 en la axila; encías congestionadas dando sangre á la presión; lengua húmeda con una ligera capa blanquecina amarillenta en el centro. Siguió la misma alimentación sin ofrecer nada de particular en este día.

Día 1° setiembre: Cesa la congestión gingival, tiene apetito, el pulso sigue en 48, la temperatura 36.2° pasando así todo el día.

Día 2: No presenta nada de particular. La convalescencia es franca, permitiéndose al enfermo que se levante un par de horas al medio día, tomando media ración de pollo y vino jerez.

Día 3: Sigue bien ligero ictero de las conguntivas oculares; el pulso de este enfermo está á 108°, la temperatura normal. Por sus antecedentes, que manifestó resulta ser alcoholista y que existen trastornos circulatorios.

Día 7: Ha seguido bien estos días reponiéndose de fuerzas saliendo hoy curado.

Tercera observación.—Jaime Juan de Manuel, soldado de la segunda compañía del 2° batallón del regimiento de infantería de Isabel la Católica, hijo de la Inclusa de Barcelona, de 24 años, albañil, empezó á servir el día 20 de diciembre de 1890. Es de constitución pasiva y temperamento linfático. Lleva 34 meses en la Isla, residiendo á su llegada en Santiago de Cuba, pasando algun tiempo luego en operaciones de campaña, y viviendo en la Habana desde hace 18 meses. Estuvo en el mes de julio del año pasado en este hospital, siendo diagnosticada su enfermedad de fiebre amarilla.

Refiere que al amanecer del día 31 de agosto se sintió enfermo, con un escalofrío inicial, fiebre y quebrantamiento general, entrando en el hospital á las 9 de la noche presentando temperatura 38.7°, 120 pulsaciones, lengua saburrosa y demás síntomas propios de la endemia, disponiendo el médico de guardia un purgante de 100 gramos de sulfato de sosa disuelto en 400 de agua para tomar en dos veces.

Día 1° de setiembre: En la mañana de hoy presentaba 39.6° de temperatura, pulso

fuerte, 100 pulsaciones, lengua blanquecina, encías congestionadas, lividez de los labios, inyección de la red capilar, congestión de las conjuntivas, fuerte cefalalgia supra-orbitaria, sin epigastralgia ni raquialgia. Hizo una deposición biliosa seguida de otra de igual carácter, recogiéndose 100 gramos de orina de color amarillento de reacción ácida, densidad, 1.022, sin albumina ni fosfatos.

Se dispuso su ingreso en la Cámara Polar que se efectuó bajando la temperatura á 15° á las 11 de la mañana.

Desde su entrada en el aparato hasta las 4 de la tarde hizo tres deposiciones biliosas, orinando una vez 25 gramos y otra 65, presentando esta última indicios de albumina. La temperatura es de 39.4°, el pulso deprimido, 80 pulsaciones.

Á las 6 hizo otra deposición clara y orinó 175 gramos.

A las 9 y 30 de la noche, la temperatura es de 38.9°, el pulso lleno y fuerte, notándose que la temperatura interior de la cámara estaba á 17°, se dispuso cargar más la mezcla hasta bajarla á 14°. Durante la noche hizo dos deposiciones alcalinas y de aspecto bilioso, orinando 175 gramos una vez, 100 otra y 175 otra vez.

Día 2: Desde las 6 de la mañana orinó en tres veces 210 gramos, que practicando su análisis resultó comprobarse evidentemente la albumina. Presenta 38.7° de temperatura, pulso lento y deprimido, 76 pulsaciones. Dice que durante la noche estuvo mal, sintiendo mucho frío y fuerte cefalalgia, no pudiendo dormir. La lengua menos flogosiada, húmeda, no hay epigastralgia, vómitos ni nauseas, sed medianamente aumentada, inteligencia clara.

A las 10 pulso pequeño, deprimido, 66 pulsaciones; se le dispuso tomase 15 gramos de ginebra aguada, repitiendo la dósis cada dos horas.

A la 1 orinó 150 gramos de orina albuminosa.

Á las 4 y 30 orinó 100 gramos, presentando á esta hora 38.8° de temperatura y 76 pulsaciones, no aqueja dolor ni molestia alguna.

A las 6 y 40 volvió orinar 100 gramos, haciendo una deposición clara y quedándose dormido hasta las 9 de la noche que le despertamos para examinarlo, teniendo la misma temperatura pero con pulso más levantado, diciendo se encuentra muy bien.

Día 3: Ha pasado la noche con sueño tranquilo despertando tan solo para orinar, recogiéndose de diferentes emisiones de orina, 590 gramos de líquido con densidad de 1.021, dando el análisis 16 gramos de urea por litro y 0.640 milígramos de ácido úrico y 0.800 milígramos por litro de albúmina coagulable. Á la hora de esta visita presenta 37.9° de temperatura, 76 pulsaciones, pulso blando y deprimido, lengua ancha, húmeda y ligeramente blanquecina; no hay epigastralgia, nauseas ni vómitos, inteligencia despejada; se le dispuso una cucharada de jerez para tomar cada dos horas, pero por repugnarle al enfermo hubo que sustituirle por una cuchara de coguac con agua.

Á las 4 y 2 de la tarde presentaba 38.1° de temperatura y 72 pulsaciones sin ningún otro cambio en su estado general, habiendo orinado 230 gramos en dos veces.

Á las 9 y 25 de la noche tenía 38.4° de temperatura y el pulso como por la tarde, la lengua húmeda y limpia en la punta. Durante la noche que pasó tranquilamente, orinó en cuatro veces 405 gramos y analizada por la mañana presentaba los mismos caracteres que la anterior, con igual cantidad de albúmina.

Día 4: Á las 9 y 30 de la mañana tenía 37.8° de temperatura y 72 pulsaciones, el pulso menos deprimido, la lengua húmeda, limpiándose, encías rosadas sin dar sangre á la presión. Se le dispuso la leche fría para tomar á cucharadas.

Á las 11 y 30 orinó 125 gramos con más albumina que las anteriores y con pigmentos biliares.

Á las 4 y 30, 38.3° de temperatura, pulso muy pequeño, á 72, se queja de frío sobre todo en los piés, no hay ningún síntoma que llame la atención, se le dispuso la poción tónica Jaccoud para tomar una cucharada alternando con la leche.

Á las 9 de la noche la temperatura bajó á 37.5°, el pulso lo mismo. Había orinado en dos veces 225 gramos.

Día 5: Durante la noche orinó 310 gramos con albúmina y biliverdina, la temperatura es á las 9 y 30 de la mañana 36.8°, el pulso más desenvuelto, á 60, lengua húmeda, ancha, cubierta de un barniz que le comunica color amarillento y está constituido por una oxidación sero-sanguinolenta. Sigue á leche y con la poción tónica.

Á las 5 de la tarde la temperatura es de 37.3°, el pulso á 61, más fuerte que por la mañana, ha desaparecido la coloración de la lengua y el barniz que la cubría, presentándose limpia y húmeda. No acusando su estado ningún signo que indique deba permanecer más tiempo en el aparato, se dispone ir elevando la temperatura de la cámara para su salida.

Á las 9 y 30 de la noche la temperatura es de 36.3°, pulsaciones 68; salió de la cámara á las 10 y 30, durmiendo tranquilamente y orinando durante la noche 350 gramos de líquido y por el análisis da los mismos caracteres con mucha albumina.

Día 6: Á las 9 de la mañana la temperatura es de 38.2°, pulsaciones 88, el pulso lleno, lengua hemorrágica con tendencia á secarse, las encías dan sangre á la presión, ictero. Se le suspende la leche y queda sólo con la poción tónica. Á las 10 de la

mañana orinó 60 gramos y á las 12 orinó 95 gramos, ámbas orinas tienen mucha albumina y biliverdina. Se suspende la poción tónica quedando sin alimento ni medicación.

Á las 4 de la tarde el pulso y la temperatura están como por la mañana; la lengua sigue hemorrágica y las encías dan abundante sangre, sed aumentada; orinó 150 gramos á esta hora con aumento de la biliverdina. Se le puso un enema de agua fría haciendo una deposición corta y biliosa.

Á las 9 de la noche la temperatura es de 36.4°, 76 pulsaciones, está tranquilo; se le dispuso vino de jerez con agua de Seltz para tomar cada dos horas.

Durante la noche orinó 315 gramos de orina, color caoba, con bastante albumina teñida por los pigmentos biliares; ha dormido bien.

Día 7: A las 9 de la mañana, temperatura 37°, pulso blando á 72; sigue la hemorragia por la lengua y las encías; el color ictérico de las conjuntivas y de la piel es muy marcado; no aqueja dolor alguno; se le dispone leche fría para tomar tres cucharadas cada dos horas.

Á las 5 de la tarde temperatura como por la mañana, 64 pulsaciones; desde la visita de la mañana orinó en tres veces 250 gramos que presentan los mismos caracteres al análisis.

Á las 9 de la noche la temperatura es de 36.2°, el pulso más desenvuelto, dá 60 pulsaciones, la lengua húmeda y rosada, las encías fluyen ligeramente sangre por su borde alviolar; orinó 30 gramos con menos albumina, peso con más cantidad de biliverdina que comunica al reactivo de Esbach, color verde esmeralda.

Pasó la noche tranquilo, orinando en ocasiones á 130 gramos disminuyendo la albúmina y la biliverdina.

Día 8: La temperatura á las 9 de la mañana es de 36.2° y el pulso blando á 68, sin quejar malestar alguno, manifestando siente apetito.

Durante el día ha orinado en varias veces 435 gramos presentando todavía alguna albumina en pequeña cantidad.

En la visita de la noche la temperatura y el pulso están como por la mañana sin ofrecer nada de particular.

Día 9: Sin novedad, toma caldo y leche. Hay ligeros vestigios de albúmina en la orina, estando el íctero muy marcado. Pasó el día bien.

Día 10: Sigue lo mismo; toma sopa y jerez.

Día 11: Manifestó apetito, aumentándose la alimentación con media ración de gallina.

Los días 12 y 13 los pasó bien, reponiéndose de fuerzas con la alimentación, haciendo sus digestiones normales.

Día 14: Aqueja dolor en los piés, diciendo que ya lo notó al salir de la cámara, pero que no lo dijo porque no le molestaba gran cosa. Durante la noche anterior el dolor aumentó impidiéndole el dormir. No se aprecia inflamación en los músculos ni en las articulaciones de los piés: se le dispone fricciones con bálsamo de Opodeldoc.

Día 16: Siguen los dolores rumatoideos en los piés que se exacerban durante la noche; se le ordenan fricciones con el cloroformo gelatinizado.

Día 18: Han mejorado los dolores; hay apetito y aumento de fuerzas.

Día 20: Sin novedad en el estado general; torpeza al andar por lo que aún le molestan los dolores.

Día 25: Van cediendo los dolores; sólo queda algo de íctero.

Día 30: Sin dolor alguno, estado general satisfactorio.

Día 2 de octubre: Curado, sale de alta.

Quarta observación.—Marcelino Noya Escribat, soldado de la 2ª compañía del 2º batallón del regimiento infantería de Tarragona, hijo de Ramón y de María, natural de Pradit (Barcelona), de 21 años de edad, oficio labrador, quinto del año 1891, de constitución pasiva, temperamento linfático nervioso, sin idiosincracia conocida; dice que el año pasado padeció en la península de viruelas y tifus.

Día 3 de setiembre: A las 5 de la tarde ingresó en el hospital, manifestando que á las 12 de la noche anterior se sintió enfermo, teniendo que ser relevado del servicio de guardia; que de repente fué acometido de un violento escalofrío, al que siguieron dolores contusivos generales y fiebre alta; que no hizo uso de ningún alimento ni medicamento hasta que le trajeron al hospital. Al examinarlo presentaba mucha cefalalgia supra-orbitaria, epigastralgia y raquialgia, lengua saburrosa, temperatura 39.9°, 128 pulsaciones, pulso fuerte y lleno, congestión de la cara y cuello, inyección de las conjuntivas, marcha vacilante. Se le dispuso un purgante de 60 gramos de sulfato de sosa, que tomó á las 6 de la tarde, y enemas de la misma sal, vomitando ámbos. Se le dispuso un nuevo purgante á las 8, que también lo vomitó, y á las 9½ de la noche ingresó en la Cámara Polar, administrándose un purgante frio de sulfato de sosa, repitiéndose los enemas.

Á las 11 de la noche empezó la acción del purgante y continuó toda la noche cesando los vómitos; las deposiciones en un principio eran amarillentas y fétidas, orinando al mismo tiempo sin poderse recoger la orina. Se le administró otro pur-

gante y enemas de sulfato de sosa hasta que las deposiciones desde las 5 de la mañana se presentaron claras y serosas.

Á las 5½ orinó 150 gramos de orina en que se aprecia ligera cantidad de albumina; volviendo á orinar á las 8½ en cantidad de 70 gramos, siendo evidente la albumina.

Día 4 de setiembre: Á las 9½ de la mañana la temperatura es de 39.2°, pulso fuerte á 64, la cefalalgia ha disminuido; hay poca epigastralgia y alguna raquialgia, la lengua húmeda, las encías menos flogosiadas; se le dispuso un purgante de 25 gramos de citrato de magnesia.

Á las 10½ tomó otra dósis igual de citrato de magnesia, y se le pusieron dos enemas de sulfato de sosa, haciendo deposiciones claras y abundantes. Orinó 75 gramos, volviendo á orinar á las 3 de la tarde 200 gramos, manifestándose la albumina en ámbas orinas.

Á las 4 y 45 de la tarde la temperatura es de 39.4°, pulso lleno á 72; cesa la epigastralgia, aquejando alguna cefalalgia y raquialgia; hay tos, y dice que hace quince días tuvo un catarro bronquial; la expectoración es mucosa clara; la lengua está húmeda, limpia en la punta, algo blancuzca en los bordes y fondo; la oscultación y la percusión no revelan exista ningún padecimiento torácico. Á las 7 de la tarde orinó 200 gramos é hizo una deposición de color oscuro con puntos negros.

Á las 9 de la noche la temperatura es de 38.6°.

Á las 10½ tomó 25 gramos de citrato de magnesia. A las 11 orinó 175 gramos con bastante albumina. Á las 11½ tomó otros 25 gramos de citrato de magnesia. Á las 2 de la madrugada orinó 125 gramos, haciendo una deposición abundante, de aspecto borroso. Á las 7 de la mañana orinó 150 gramos é hizo otra deposición análoga á las anteriores.

Día 5 de setiembre: Á las 9 de la mañana pulso pequeño á 60, temperatura 38°, lengua seca y áspera en el centro; no hay epigastralgia ni dolor alguno; aplanamiento; se suspende toda medicación.

Á las 2 de la tarde orinó 175 gramos con albumina, haciendo una deposición borrosa característica.

Á las 5 de la tarde temperatura 38°, pulso lleno á 68; lengua húmeda, ancha y ligeramente blancuzca; no aqueja dolor alguno; ha cesado latos, la inteligencia despejada.

A las 5½ orinó 100 gramos y á las 6 otros 100, apreciándose la albúmina en ámbas orinas; hizo una deposición muy negra.

Á las 9½ de la noche temperatura 38.2°, pulsaciones 76 y algo deprimido el pulso.

Durante la noche se recojieron 325 gramos de orina en la que ha desminuido la albúmina.

Día 6 de setiembre: A las 9½ de la mañana la temperatura es de 37.2°, el pulso algo más lleno marca 56 pulsaciones; la lengua está ancha y húmeda moteada en el centro de puntos rojos; no hay cefalalgia ni epigastralgia; bienestar general.

Á las 10½ tomó 15 gramos de ginebra aguada, orinando á la una de la tarde 80 gramos, manifestándose todavía la albúmina.

Á las 4½ de la tarde temperatura 38°, pulso lleno á 64 no presenta ningún fenómeno apreciable. Se le puso un enema de agua fría haciendo una deposición biliosa con puntos negros; orinó 125 gramos volviendo á orinar á las 8½ con alguna albúmina.

Á las 9½ de la noche temperatura 37.3°, pulso pequeño á 64; sigue tomando la ginebra aguada cada 4 horas.

Durante la noche se recogieron 180 gramos de orina disminuyendo en ella la albúmina.

Día 7: Á la 9½ de la mañana temperatura 36.2°, pulso pequeño y deprimido á 76; lengua ancha algo blanquecina en el fondo y desprovista de epitelios en los bordes; no hay epigastralgía ni cefalalgía; semblante animado expresando que se encuentra muy bien. Se le dispone la poción tónica Jaccoud para tomar una cucharada cada 2 horas.

Á las 10 orinó 60 gramos, y á las 2 de la tarde 80 gramos con muy poca albumina.

Á las 5½ de la tarde temperatura 36.8°, pulso pequeño á 56; se le puso un enema de agua fría, haciendo una deposición biliosa con gramos de materia fecales; se recogieron 100 gramos de orina en la que sólo hay vestigios de albúmina.

Á las 9½ de la noche temperatura 36.8°, pulsaciones 64, el pulso lleno y regularizado; lengua normal. Se dispone ir elevando la temperatura de la cámara que está á 14° para su salida por la mañana.

Durante la noche orinó 500 gramos en dos veces, existiendo aún vestigios de albumina sin pigmentos biliares.

Á las 7 de la mañana salió de la cámara.

Día 8: Á las 9 de la mañana temperatura 38°, pulso 76, lengua húmeda con una capa amarillenta en su fondo; no presenta ningún otro síntoma particular.

Pasó este día bien, tomando la poción tónica; orinó varias veces sin albumina.

Á las 8 de la noche pulso lleno á 68, temperatura 37.5°; tiene alguna tos blanda con expectoración mucosa acreada sin que por el reconocimiento que se le hizo se aprecie lesión inflamatoria.

Día 9: Sin fiebre, disminuye la tos, lengua normal. Suspensión de la poción tónica; caldo con jerez y agua carbónica.

Por la tarde sin novedad.

Día 10: Continua bien; el sueño es tranquilo, no hay tos, manifiesta apetito; sopa.

Día 11: Sigue bien, media ración de pollo; se levanta.

Día 13: Sin novedad, ración y vino.

Día 16: Sale de alta curado.

Quinta observación.—Tomàs Lopez Lobada, trompeta del regimiento caballería de Pizarra; hijo de Mariano y de Martina, natural de Madrid de 23 años; albañil; empezó á servir el 30 de marzo de 1891; es de constitución activa, temperamento sanguineo. Este individuo lleva 19 meses en la Isla, habiendo permanecido en el campo algún tiempo gozando buena salud. El año pasado entró en la enfermería de Güines por padecer forrunculosis; el día 3 del mes de setiembre corriente entró en el hospital de esta plaza con una úlcera simple de la que salió curado el día 9. Ayer, día 11, á las 8 de la mañana, se sintió enfermo con alguna fiebre y malestar general que se presentaron después de un escalofrío violento; no hizo uso de tratamiento alguno y á las 24 horas vino al hospital. Es de suponer con tales antecedentes que la incubación de la enfermedad viene de antes de salir el día 9 de la sala de cirugía.

Día 12 de setiembre: A su ingreso el médico de guardia le dispuso un purgante de 50 gramos de sulfato de sosa que se repitió cuatro horas después haciendo varias deposiciones, las primeras alimenticias y las últimas serosas, orinando una vez en cantidad de 175 gramos cuyo líquido no ofrece nada de particular.

Á las 4 de la tarde le vió la comisión presentando temperatura 39.2°, pulsaciones 108; lengua encendida en los bordes y saburrosa en el centro; encías congestionadas, rubicundez de la cara y cuello, inyección de las cojuntivas, cefalalgia supra-orbitaria, amodorramiento; no hay epigastralgia ni raquialgia; la orina emitida presenta albúmina característica; se dispuso su ingreso en la cámara que verificó á las 9 de la noche, poniéndole enemas de sulfato de sosa hasta que se presentaron las deposiciones claras.

Á las 10 de la noche temperatura 38.1°, pulso duro y lleno á 96, ofreciendo los mismos síntomas que por la tarde; durante la noche se recogieron 200 gramos de orina que ofrecen albúmina.

Día 13 de setiembre: Á las 9 de la mañana temperatura 37.9°, pulso lleno, 88 pulsaciones; lengua menos flogosiada, encías menos congestionadas; desapareció la cefalalgía y dice hallarse muy bien.

Á las 4½ de la tarde temperatura 38°, pulso más blando á 88; no hay náuseas ni epigastralgía; analizada la orina no presenta tanta albumina como por la mañana.

A las 9 de la noche temperatura 36.9°, pulso regular á 64; la lengua está limpia, no aqueja malestar alguno; hay sed y siente frío; la temperatura de la cámara está á 14°.

Día 14 de setiembre: A las 8 de la mañana temperatura 37.2°, lengua limpia, apetito, no hay ningún dolor, ligero íctero de la conjuntivas, estado general satisfactorio; analizada la orina en cantidad de 350 gramos que emitió durante la noche no se aprecia la albumina; se le dispone leche fría para tomar cada 4 horas 120 gramos.

Á las 4 de la tarde la temperatura es de 37.3°, pulso regular á 64, no presentando nada de particular; se dispone ir subiendo gradualmente la temperatura de la cámara para su salida que verificó á las 7 de la mañana siguiente en que la temperatura interior del aparato era igual á la del ambiente exterior.

Día 15: El pulso sigue blando y pequeño, siendo el estado general bueno, manifestando apetito, disponiéndose que con la leche alterna caldo con jerez.

Día 16: Sin novedad; convalescencia franca; sopa y jerez.

Día 18: Toma ración de pollo; encontrándose bien.

Día 21: Sale de alta curado.

Sexta observación.—Bernardo Lozano, soldado de la 4ª compañía del 2º batallón del regimiento infantería de Isabel la Católica, hijo de Juan y de Aquilina, natural de Córdova, de 20 años de edad, oficio, labrador; empezó á servir el 1º de febrero de 1890, de constitución pasiva, temperamento linfático; lleva 31 meses en la Isla, residiendo el primer año en la jurisdicción de Guantánamo, 2 meses en el campo de esta provincia y en la Habana lleva 17 meses de guarnición.

Según refiere, el día de ayer lo pasó bien, habiendo bajado al medio día desde el Castillo del Príncipe á la población, estando en ocupaciones expuesto al sol, y cuando subió á su cuartel á las ocho de la noche se sintió mal con dolores contusivos en todo el cuerpo, falta de apetito y alguna fiebre, pasando así toda la noche sin aliviarse. En la mañana de hoy tomó un purgante de magnesia que le produjo vómitos sin ninguna deposición.

Día 14 de setiembre: Este día ingresó en el hospital á las 4 de la tarde, presentando 40.2° de temperatura, 112 pulsaciones, pulso lleno pero depresible, cefalalgia supra-orbitaria muy intensa, fuerte raquialgía, alguna epigastralgía, lengua roja en los bordes y puntos, saburrosa en el centro, encías congestionadas, marcándose la

línea gingival, inyección de las conjuntivas, tendencia al sopor, no orina desde las 8 de la mañana.

Entró en la cámara á las 5½ de la tarde, disponiéndose un purgante de 60 gramos de sulfato de sosa y enemas de la misma sal, haciendo una deposición de escrementos naturales á las 6 de la tarde.

Á las 7 se repitió el purgante que le produjo vómitos biliosos, haciendo otra deposición á las 8 de materiales escrementicios semi-líquidos. Á las 8½ emitió 10 gramos de orina en la que se descubrió la albúmina en indicios por el reactivo de Esbach.

A la 9 de la noche la temperatura es de 40°, pulsaciones, 96, disminuye la cefalalgia aquejando fuerte raquialgia. Á las 9½ orinó 135 gramos descubriéndose la albúmina é hizo una deposición como las anteriores. Volvió á orinar á las 12½ en cantidad de 20 gramos, é hizo otra deposición más clara. Á las 6 de la mañana orinó 125 gramos siendo evidente la albúmina. Á las 8 tuvo un ligero epistasis que se contuvo con afusiones frías.

Día 15 de setiembre: Á las 9 de la mañana la temperatura es de 38.1°, pulsaciones 72, pulso deprimido; desapareció la cefalalgia, hay epigastralgia y raquialgia, disminuye la congestión de la red capilar del rostro y cuello.

Á las 1½ de la tarde orinó 80 gramos, siguiendo la albúmina. Á las 2 hizo una deposición corta de carácter bilioso.

Á las 4½ de la tarde la temperatura es de 38.6°, pulso deprimido á 80; sigue la epigastralgia, disminuyendo la raquialgia. Á las 7 de la noche orinó 150 gramos con albúmina.

Á las 9 de la noche la temperatura subió á 39°, disponiéndosele un purgante de 50 gramos de sulfato de sosa, haciendo una deposición á las 9½ con materiales alimenticios, repitiendo otra más abundante á las 10 de la noche. Hay tendencia al vómito durante la noche, verificándose varias deposiciones biliosas claras, recogiéndose 235 gramos de orina emitida durante la noche.

Día 16: Á las 9 de la mañana la temperatura es de 37.7°, pulso lleno á 68, lengua algo blanquecina; cesó la epigastralgia y los demás dolores; no hay náuseas, inteligencia despejada. Á las 10 hizo una deposición biliosa y orinó 100 gramos con albúmina.

Á las 4 de la tarde la temperatura es de 37.6°, pulso 80, deprimido; la orina contiene poca albúmina.

Á las 9 de la noche el pulso y la temperatura son como por la tarde; se le dispone una dósis de 15 gramos de ginebra con agua, orinando á las 11½, 150 gramos y á las 4 de la mañana 125 gramos, teniendo poca albúmina ámbas orinas.

Día 17: Á las 9 de la mañana la temperatura es de 36.5°, pulsaciones 72, el pulso pequeño y deprimido, la lengua menos flogoseada; no aqueja dolor alguno, dice que durmió bien toda la noche; su semblante está animado. Durante el día orinó varias veces, existiendo tan solo indicios de albúmina.

Á las 4 de la tarde la temperatura es de 36°, pulso deprimido á 60.

Á las 9 de la noche la temperatura es de 36.7°, pulsaciones 60, sueño tranquilo; no aqueja dolor alguno. Se le dispone la poción tónica de Jaccoud para tomar una cucharada cada tres horas, ordenando que á la madrugada deje de echarse hielo en las cajas refrigeradoras para elevar la temperatura interior de la cámara.

Día 18: Á las 8 de la mañana salió de la cámara, presentando á las 9, temperatura 37.5°; pulso reaccionado á 92, lengua húmeda y limpia; la orina es ligeramente albuminosa. Sigue con la poción tónica.

Por la tarde sin novedad, y el pulso y temperatura normales.

Día 19: No hay dolor alguno, está animado; la orina sigue albuminosa. Ración de leche.

Día 20: Sin novedad, se le dispone caldo y jerez para alternar con la leche.

Día 22: Sigue bien, siendo franca su convalescencia; sopa.

Día 23: Sin novedad, media ración de pollo.

Día 26: Sale de alta curado.

Séptima observación.—Bartolomé Pascual Moras, soldado de la 1ª compañía del segundo batallón del regimiento Infantería Isabel la Católica, hijo de Pedro y de Blasa, natural de Barcelona, de 21 años de edad, quinto de 1890, de constitución pasiva, temperamento linfático nervioso; hace 17 meses llegó á la Isla, habiendo permanecido en el campo; reside en la Habana hace solo 23 días. Según dice se sintió enfermo el día 15 de setiembre (ayer) á las 3 de la tarde, precediendo al malestar general un escalofrío violento seguido de cefalalgia y quebrantamiento de huesos, no habiendo tomado desde entónces ningún alimento ni medicamento, presentándose en el hospital á las 8 de la noche.

Día 16 de setiembre: Á su ingreso lo reconoció la comisión, y tenía 39.9° de temperatura, pulso lleno y fuerte á 108; cefalalgia, supra-orbitaria muy intensa, congestión del rostro y cuello, inyección conjuntival, gran dolor en el epigastrio y en toda la columna vertebral, lengua flogosiada en los bordes y punta, blanquecina y áspera en el centro, encías conjestionadas, marcándose una línea supra-alveolar de color violaceo, labios cárdenos; orinó poca cantidad que se enturbió ligeramente por el reactivo de Esbach.

Se le colocó en la Cámara Polar inmediatamente, empezando á bajar gradualmente la temperatura interior del aparato.

Se le administraron duranre la noche tres purgantes de sulfato de sosa á dósis de 50 gramos, y cuatro enemas con la misma sal. Hizo varias deposiciones biliosas después de haber hecho algunas escrementicias; las últimas deposiciones de la madrugada eran serosas y claras, tuvo algunos vómitos biliosos, orinó cinco veces en pequeña cantidad, recogiéndose en total 215 gramos de orina con 10.30 de densidad de reacción ácida sin albúmina.

Día 17: A las 9 de la mañana temperatura 38.8°, pulso pequeño y deprimido á 64; menos cefalalgia hay alguna epigastralgia, desaparece la raquialgia. Por la tarde tenía 38.4° de temperatura, pulso á 60, más deprimido; orinó durante el día 175 gramos en 3 veces sin vestigios de albúmina.

Á las 9 de la noche temperatura 38°, pulsaciones 56, el pulso es muy pequeño y lento; rostro encendido, la cefalalgia ha aumentado, volviendo á presentarse la raquialgia; lengua blanquecina; tose un poco. Se le dispone la poción tónica de Jaccodd para tomar una cucharada cada tres horas.

Día 18 de setiembre: Ha pasado la noche bien, durmiendo á la madrugada y despertando despejado sin aquejar dolor alguno, la lengua menos flogosiada, la temperatura 36.9°, 60 pulsaciones.

Por la tarde sigue lo mismo; ha orinado 200 gramos sin manifestarse la albúmina.

Á las 9 de la noche el pulso bajó á 54, estando pequeño y deprimido, orinó 80 gramos sin albúmina.

Día 19: Temperatura 36.3°, pulso 44, muy deprimido; no hay dolor alguno, se le dispone leche para alternar con la poción tónica.

Por la tarde sin novedad, sigue igual.

Por la noche el pulso más levantado á 56.

Día 20: Por la mañana no tiene novedad, disponiéndose salga de la cámara, á cuyo fin se deja vaya licuándose la mezcla refrigorífica para subir la temperatura interior.

A las 3 de la tarde salió del aparato tomando caldo y jerez.

A las nueve de la noche sin novedad, temperatura 37°, pulso 64, manifestando picor en los piés que le molestan mucho, presentando ligera erictema en dichas extremidades.

Día 21: Su estado general es satisfactorio, molestándole tan sólo el erictema de los piés, disponiéndosele fricciones con alcohol alcanforado.

Día 22: Sigue bien; sopa.

Día 24: Sin novedad, media ración de pollo y jerez.

Día 30: Ha desaparecido por completo el erictema; lleva cuatro días de comer ración, encontrándose perfectamente por lo que sale de alta.

Octava observación.—Roque Dieguez Gallego, sargento del 1er batallón del regimiento Infantería de Cuba, hijo de Juan y de María, natural de Logroño, de constitución activa y temperamento sanguineo; hace 21 meses llegó á la Isla, permaneciendo en el campo hasta hace 7 meses que vino á la Habana. Se sintió enfermo ayer 19 de setiembre á las 3 de la tarde, principiando por sentir un fuerte escalofrío después del cual tuvo fiebre y quebrantamiento general. Por la noche tomó un vomitivo sin que remitiese la fiebre.

Día 20 de setiembre: Ingresó en el hospital á las 8 de la mañana presentando gran cefalalgia, supra-orbitaria, mucha raquialgia, sensibilidad al epigastrio, inyección de las conjuntivas, congestión de las encias, lengua flogosiada en la punta y bordes con una capa blanquecina en el centro, mucha sed, haciendo 8 horas que no orina, temperatura 38.9°, pulso 112. Se le dispuso un purgante de 100 gramos de sulfato de sosa en 300 de agua y enemas de la misma sal.

Á las 10½ de la mañana ingresó en la Cámara Polar, repitiéndosele los enemas cada dos horas, haciendo deposiciones biliosas oscuras.

Á las 2 tomó otro purgante de sulfato de sosa, haciendo otra deposición, habiéndose recogido 60 gramos de orina, en la que ya se indica la albúmina. Siguieron las deposiciones, siendo las últimas más claras.

A las 4 de la tarde temperatura 39.3°, pulsaciones 96, el pulso blando; disminuye algo la cefalalgia y la raquialgia.

Durante la noche orinó 600 gramos en diferentes veces con abundante albúmina.

Día 21: Temperatura 39°, pulsaciones 84; sigue la cefalalgia; hay raquialgia disminuyendo la epigastralgia; ictero de las conjuntivas, lengua húmeda y rosada en los bordes, blancuzca en el centro, encías menos conjestionadas; orinó 110 gramos con mucha albúmina. Durante el día hizo varias deposiciones biliosas, orinando en dos veces 180 gramos análogo á las anteriores.

Á las 4 de la tarde temperatura 39.2°, pulso lleno á 84, sigue la cefalalgia aunque no tan intensa, hay epigastralgia cediendo por completo la raquialgia; ictero marcado, la lengua se va limpiando, la orina tiene mucha albúmina.

A las 9 de la noche temperatura 38.7°, pulso fuerte, 100 pulsaciones, lengua limpia, poca cefalalgia, inteligencia despejada, habiendo dormido algunas horas.

Durante la noche hizo varias deposiciones cortas, biliosas, y orinó en varias veces 690 gramos de orina muy albuminosa.

Día 22: El íctero de la esclerótica es muy marcado; poca sensibilidad al epigastrio, sin nauseas; está muy animado. Aqueja un poco dolor al costado derecho del que dice ha padecido anteriormente, habiendo tenido un catarro con esputos sanguíneos.

Auscultado no se percibe nada de particular, tampoco la percusión acusa ningún fenómeno torácico, temperatura 38.2°, pulso 80.

Durante el día orinó 285 gramos con mucha albúmina; á las 4½ de la tarde temperatura 38.3°, pulsaciones 84; sin dolor alguno, despejado, marcándose el íctero.

Durante la noche orinó en varias veces 650 gramos con una gran cantidad de albúmina.

Día 23: Á las 9 de la mañana temperatura 37.7°, pulsaciones 84, el pulso pequeño y deprimido. Ha orinado en varias veces 290 gramos con notable albuminuria.

Á las 5 de la tarde temperatura 38.4°, pulso 74, sigue bien, tendencia al sueño; durante la noche hizo varias deposiciones biliosas y se recogieron 795 gramos de orina, habiendo disminuido algo la albúmina.

Día 24: Á las 9 de la mañana temperatura 38.2°, pulsaciones 72, sin novedad íctero marcado; desde esta hora hasta la tarde ha orinado 550 gramos, siendo la última emitida más clara y con menos albúmina.

Á las 4 de la tarde temperatura 38.2°, pulsaciones 90, el pulso lleno y fuerte; no aqueja dolor alguno, duerme bastantes horas.

Á las 9 de la noche temperatura 39.2, pulsaciones 80, sin novedad.

Desde la tarde de hoy hasta la mañana siguiente se han recogido 1205 gramos de orina que tiene bastante albúmina.

Día 25: Á las 9 de la mañana temperatura 37.4°, pulsaciones 68, sin aquejar molestia alguna; se le dispone la leche fría para tomar 90 gramos cada tres horas, ordenando que se deje de enfriar el aparato.

Á la una de la tarde salió de la cámara.

Á las 4 de la tarde temperatura 37.7°, pulsaciones 80, muy tranquilo, desde la mañana orinó 330 gramos con bastante albúmina.

Día 26: Desde la tarde de ayer á la hora de visita de hoy orinó 4 veces 850 gramos, presantando todavía abundante albúmina y ligeros pigmentos biliares; temperatura 36.7°, pulsaciones 68, lengua limpia y húmeda, color ictérico de todo el ingumento; apetito. Se le dispone caldo y jerez para alternar con la leche.

Ha dormido tranquilamente durante la noche, orinando 360 gramos igual á las anteriores.

Día 27: Á las 9 de la mañana está apirético, la lengua limpia, las encías fuliginosas; no aqueja dolor alguno, ha orinado durante la noche 425 gramos con bastante albúmina y mucha biliverdina; manifiesta apetito, disponiéndosele sopa y leche; por la tarde sigue bien, la orina lo mismo.

Día 28: Sin novedad, persistiendo la albuminuria, media ración y jerez.

Día 30: Cesa la albúmina en la orina, ración.

Día 2 de octubre: Sale de alta.

Novena observación.—José Requesno Fortuny, guardia segunda de la 4ª compañía del batallón de Orden Público, hijo de José y de Coloma, natural de Tarragona, lleva 9 meses en la Isla sin salir de la Habana. Dice que hace días se sentía mal pero sin tener fiebre ni poder expresar otros síntomas que un gran malestar general, el día de hoy (23 setiembre), estando de servicio en la calle, se sentió enfermo con un escalofrío, dolores contusivos en todo el cuerpo y algo de fiebre.

Día 23 de setiembre: Ingresó en el hospital á las 2 de la tarde, presentando temperatura 40.5°, pulso fuerte á 136, gran inyección de la cara y cuello, cefalalgia supra-orbitaria muy intensa, raquialgia fuerte, epigastralgia y dolores contusivos en las extremidades de la manera que fué preciso subirle en una silla de manos á la sala. Se le dispuso un purgante de sulfato de sosa que lo vomitó.

Entró en la Cámara Polar á las 5 de la tarde repitiéndole el purgante.

Á las 6 de la tarde temperatura 39.3°, pulsaciones 128, siguen los demás síntomas: vómitos, lengua roja, encías conjestionadas. Á las 6½ hizo una deposición excrementicia y orinó 100 gramos en los que se indica la albúmina.

Á las 9 de la noche dice se halla muy aliviado de la cabeza y de los demás dolores; la inyección conjunctival es mayor, temperatura 38.2°, pulsaciones 100, se repite el sulfato de sosa, siguiendo al purgante varias deposiciones excrementicias.

Á las 6½ de la mañana siguiente orinó 200 gramos, en que se aprecia con claridad la albúmina.

Día 24 de setiembre: No hay cefalalgia ni epigastralgia, alguna raquialgia; lengua menos encendida, las encías muy conjestionadas; no hay náuseas ni vómitos, inteligencia despejada, dice se encuentra muy bien; temperatura 38.7°, pulso blando á 90; hizo una deposición abundante biliosa, orinando 300 gramos que indican albúmina.

Á las 4 de la tarde la temperatura es de 39°, pulso blando á 88; inyección de las conjuntivas, lengua blanquecina, encías encendidas; no tiene ni cefalalgia ni raquialgia ni epigastralgia; no hay nauseas ni vómitos, la orina presenta claramente albúmina.

Día 25: Á las 9 de la mañana la temperatura es de 39.3°, pulso 88; sigue la albuminuria, habiendo orinado durante la noche 700 gramos; no aqueja dolor alguno; la lengua limpia y húmeda, las deposiciones son oscuras y fétidas. Se le dispuso un purgante de sulfato de sosa que vomitó, poniéndosele un enema de la misma sal, haciendo una deposición escrementicia mezclada con borras y de olor muy fétido.

Á las 4 de la tarde. Orinó desde la visita de la mañana 305 gramos, siendo abundante la albúmina, haciendo varias deposiciones borrosas; temperatura 39.5°, pulso blando y deprimido á 88.

Día 26: Temperatura 38.2°, pulso tan deprimido que no es posible contar las pulsaciones en la radial; no aqueja dolor alguno; hizo desde ayer tarde varias deposiciones borrosas y fétidas; ha orinado durante la noche en varias veces 1010 gramos, presentando mucha albumina todas y la última gran cantidad de biliverdina. Se le dispone la poción tónica de Jaccoud para tomar una cucharada cada dos horas.

A las 4 de la tarde. Duerme á la hora de la visita, no se le despierta; ha orinado tres veces 500 gramos con albúmina y pigmentos biliares.

Á las 9 de la noche la temperatura es de 38.9°, pulso deprimido á 80; no aqueja dolor alguno, tendencia al sueño; orinó en cuatro veces desde por la tarde 900 gramos con mucha albúmina y pigmentos biliares.

Día 27: Á las 9 de la mañana la temperatura es de 38.2°, pulso muy difícil de apreciar por lo blando y deprimido, ictero de las conjuntivas, no aqueja dolor alguno. Se le dispone un enema de agua fría con aceite de almendras, debiendo repetirse cada dos horas; sigue con la poción tónica. Hizo varias deposiciones borrosas abundantes mezcladas con algún excremento.

Á las 4 de la tarde. Orinó desde por la mañana hasta esta visita una sola vez, 350 gramos con albúmina y pigmentos biliares; temperatura 38.5°, pulso desarrollado á 96; manifiesta que se siente bien, sin embargo la respiración es asbetosa, 32 inspiraciones, tose algo, tendencia al sueño, la lengua húmeda y limpia. Sigue con la poción tónica. Desde esta hora se dejó de cargar hielo en la cámara para que suba la temperatura interior.

Á las 9 de la noche el termómetro marca dentro de la cámara 23° centígrados. Se abre la puerta, el enfermo duerme bastante profundamente; al despertar dice que le molesta la luz. Temperatura 38.4°, pulso blando á 92, fuliginosidades en las fosas nasales, fetidez del aliento, no aqueja dolor alguno; orinó 400 gramos con albúmina; la piel está madorosa, menos tos, no hay expectoración y ascultado se perciben extertores sub-crepilantes en el pulmón derecho. Salió de la cámara á las 9½ de la noche.

Día 28: Desde su salida del aparato dejó de orinar, presentando fenómenos atáxicos adinámicos, estado comatoso. Se le disponen enemas desafétidas.

Por la tarde duerme á ratos, despertando excitado con movimientos convulsivos y gritos; orinó dos veces en bastante cantidad sin poder apreciarla como lo hizo en la cámara. Se le dispone una poción de cafeina.

A las 9 de la noche sigue lo mismo, el pulso 140, los fenómenos atáxicos más acentuados; orina varias veces en la cama. Hemorragias pequeñas por la boca.

Día 29: Falleció á las 4 de la madrugada.

Autopsia: Se practicó á las cinco horas de la muerte dando el siguiente resultado: adherencias antiguas y múltiples de la pleura á la pared costal de ámbas hojas entre sí y de la pleura viceral al parenquima fusionadas tan intimamente en algunos puntos que cuesta trabajo reconocerla.

Infarto hemorrágico de arriba abajo en toda la extensión de ámbos pulmones, cuyo color es de un rojo apizarrado. Al corte cruje el tejido con la crepitación del enfisema y parecen herniarse los lobulillos al traves de su estroma conjunctiva, debido á la gran cantidad de serosidad sanguinolenta y muy espumosa que las ingurgita; caracteres microscópicos que corresponden efectivamente al enfisema inter-lobular.

El corazón se halla lesionado en un grado enorme por hipertrofia concéntrica del ventrículo izquierdo é insuficiencia mitral; el seno mitro-sigmoideo ha desaparecido ahogado por la proliferación carnosa que inmoviliza las cuerdas tendinosas y hace incompleta la oclusión valvular; de esta suerte y por compensación se ha generado la dilatación enorme que se advierte en las venas pulmonares y arteria del mismo nombre, cuyas válvulas sigmoideas se hallan borradas y como embebidas en la distensión máxima que ha llegado el orificio arterial, que más que orificio parece continuación del basto antro que forma la cavidad dilatada del ventrículo derecho.

Analizaré ligeramente las historias clínicas que acabo de leer.

Primera observación.—Este caso, cuya terminación fué por la muerte, aparece desfavorable al tratamiento por la Cámara Polar, sobre todo si fuésemos á hacer estadística, pero para nosotros tuvo alguna importancia bajo el punto de vista de nuestro estudio.

Hubo oposición para su ingreso en el aparato por parte de algunos comisionados, fundándose en las siguientes razones: Primera, porque este individuo había sido invadido dentro del hospital, y todos sabemos lo que pasa con los que vienen á las salas de cirugía, venereos, oftálmicos ó cutáneos, cuando en esta atmósfera son ataca-

dos de la fiebre amarilla, el proceso reviste caracteres de suma gravedad, falleciendo en proporción mucho mayor. Segunda, porque el enfermo al ser examinado por la comisión llevaba más de 24 horas de invadido, y por el cuadro sintomatológico se podía pronosticar desfavorablemente. Tercera, porque además de haber presentado epixtaxis, había congestión pulmonar con marcada hiperemia del lado izquierdo, acompañada de tos, haciéndonos pensar en alguna lesión de los órganos torácicos anterior á la invasión de la fiebre amarilla, y si bien no era posible corriendo un proceso agudo diagnosticar una enfermedad del pericardio, ó endocardio de la pléura ó los pulmones, pues los fenómenos hipostáxicos acompañan también á la fiebre amarilla, era de juzgar por lo menos que estos se habían presentado prematuramente, en cuyo caso el proceso infeccioso había llevado una marcha rapidísima, siendo ya tarde para ingresarlo en la cámara. Cuarta, porque la existencia de edema en la extremidad izquierda era un dato que hacia ver algo más que un enfermo de fiebre amarilla.

La comisión discutió detenidamente el diagnóstico de este enfermo, y se decidió por su ingreso en la cámara después de consultar al Dr. García, al que se le preguntó si dada la gravedad del caso creía que le fuese favorable la acción de la cámara y á fuer de imparciales debemos consignar que el Dr. García manifestó que lo aceptaba para inaugurar su tratamiento ya que de conformidad emitía la comisión su pronóstico desfavorable, pues como deseaba que se estudiase su procedimiento y no eran las estadísticas lo que él buscaba, sino que se comprobasen las acciones fisiológicas que en los enfermos se despertaban por su sistema, este enfermo podía servir para alejar el temor que se sabía tenían muchos profesores de que el frío dentro del aparato producía lesiones pulmonares, pues existiendo ya estas en el enfermo veríamos como no se acentuaban, sino que más bien se modificarían favorablemente.

La autopsia que detalladamente aparece expuesta en el historial vino á confirmar que este enfermo dentro y fuera de la cámara hubiera sucumbido, pues padecía una endocarditis ulcerosa anterior á su invasión de fiebre amarilla, y el proceso de esta enfermedad fué suficiente por sí para introducir una funesta perturbación en la marcha de la lesión primitiva que se hizo mortal de necesidad.

Por lo que hace á la acción que el frío egerciese sobre ambos procesos, significaremos que á las pocas horas de ingresar en la cámara el enfermo acusaba bienestar general, desapareciendo la raquialgia y epigastralgia, disminuyendo la cefalalgia, que pronto cesó también; la lengua se presentó húmeda y limpia, sin náuseas, con sueño tranquilo, pero habiendo entrado en el aparato con principio de anuria, esta siguió en aumento, presentándose los síntomas de la uremia tras de los que sobrevino la muerte. La auscultación y el trazado esfigmográfico nos dieron á conocer antes de su muerte las lesiones que más tarde encontramos en la autopsia. Las cámaras excrementicias en el último período nos indicaron que en este enfermo la asepsia intestinal no había sido completa.

Resulta pues que sin una asepsia perfecta, pasadas con exceso las primeras 24 horas y con una lesión orgánica, entró este enfermo en la Cámara Polar, y por tanto sin reunir las condiciones que el autor exige en su procedimiento.

Segunda observación.—El funesto resultado que tuvo el primer enfermo sometido al tratamiento por la Cámara Polar, nos hizo ver la dificultad que habría para continuar los expedientes si los enfermos se negaban á entrar en el aparato, pues debemos advertir aunque sea casi innecesario, que desde un principio convenimos en que ingresasen solamente los que voluntariamente aceptasen el tratamiento. Ante ese temor, y para levantar algo los ánimos, dispusimos someter al tratamiento un caso de fiebre amarilla de forma benigna. Este es el que figura como número 2, y lo segregaríamos de nuestras observaciones si nuestra misión fuera hacer estadística, pero como hemos repetido, nuestro objetivo era estudiar las acciones fisiológicas de la Cámara Polar para deducir su acción terapéutica.

Por su historia clínica véis que este enfermo ingresó en la cámara con 38.2° de temperatura, pulso lleno á 88, presentando los demás síntomas característicos de la invasión, y que á las 5 horas de permanecer en el aparato desaparece el cuadro de síntomas que inician el proceso, bajando la temperatura algo más de un grado con 70 pulsaciones, marcándose una hipostenia cardiaca hasta llegar á 48 pulsaciones, á las 24 horas de estar bajo la acción de la cámara, descendiendo la temperatura á 25.5° en la axila, continuando este sostenido descenso del pulso y la temperatura. El uso de los tónicos no llegó á modificar la depresión del movimiento circulatorio, mientras permaneció sometido al frío, tardando en reacionar bastantes horas después de su salida á la temperatura ambiente.

Esta acción hipostenizante, aúnque más marcada en este enfermo, la hemos visto en casi todos los demás casos sometidos á nuestra observación.

Tercera observación.—Caso verdaderamente grave fué el tercero, pero antes de hacer consideración alguna, voy á fijar vuestra atención sobre un particular.

Según consignamos en el conmemorativo patológico, aparecía que en 9 de julio del año pasado (hace tres meses) este individuo ingresó en este hospital y fué diagnosticado como de fiebre amarilla. Pedidos antecedentes al archivo consta así en su hoja clínica formada por nuestro compañero Dr. Mariano Osuna, y como nos inte-

resaba confirmar nuestro actual diagnóstico, hicimos que el enfermo fuese examinado por varios conprofesores, entre ellos el mismo Dr. Osuna, que lo había asistido anteriormente, y todos han estado conformes en que al presente se trataba de un caso de fiebre amarilla bien caracterizado y de forma grave, corroborando después al curso del proceso nuestro diagnóstico como podeis ver por el diario clínico.

De ninguna manera es mi ánimo molestar al digno é ilustrado compañero mi amigo, el Dr. Osuna, pero hago constar este incidente porque no han faltado censuradores que sin ver á este enfermo ni á otro alguno de esta clínica, sabiendo que ya había sido diagnosticado el año pasado de fiebre amarilla, han juzgado que había por parte de la comisión cierta ligereza en los diagnósticos.

No negaremos que antes haya pasado la fiebre amarilla, dada la competencia científica que reconocemos en todos los jefes de clínica de este hospital, pero no cabe duda alguna que al presente padecía la fiebre amarilla.

Consta en la hoja clínica anterior que en su enfermedad se empleó el tratamiento antiséptico desde los primeros momentos, y aparte de que hay opiniones que aceptan las recidivas en la fiebre amarilla, entre nosotros se encuentra el Dr. Bellver, el más entusiasta partidario de la terapéutica por los antisépticos después de la asépsia intestinal, que opina también en el sentido de que la fiebre amarilla puede recidivar en ocasiones, pensando que siendo el tífus icterodes una infección típica para inmunizar de una manera radical y permanente los organismos que invade, cree que cuando la antisepsia del tubo intestinal donde ha tenido lugar la infección es eficaz y precoz, da por resultado el aborto de la infección pudiendo el sujeto no quedar inmunizado, y según nos ha dicho, prepara sobre este tema un trabajo que muy en breve nos dará á conocer.

En este enfermo hemos observado los mismos efectos de la cámara que en los dos anteriores, más notables por tratarse de un caso que presentaba todo el cuadro sintomático con caracteres de cierta gravedad. El enfermo en el segundo período acusaba el mismo bienestar general sin dolor alguno, regularizándose el pulso y la temperatura, marcándose la depresión circulatoria, y sólo por el íctero y la albuminuria que persistieron hasta después del día 14 de enfermedad se reconocía el proceso de la endemia. La cantidad de orina emitida fué siempre grande desde su ingreso en la cámara, según puede verse por su hoja clínica.

Nos llamó la atención que este enfermo fué atacado de dolores rematoideos en los piés tan pronto salió de la cámara, molestia que hizo prolongar su convalescencia en la clínica y que debemos tener en cuenta, pues quizás en los individuos reumáticos ó artríticos pudiera tener una contraindicación el tratamiento que nos ocupa.

El Dr. García nos dijo que con alguna frecuencia había observado estos dolores así como los sabañones en los enfermos sometidos á la cámara, debido estos á las bajas temperaturas que obraban como pudieran hacerlo en los individuos sanos y que con compresas heladas había logrado hacer desaparecer estos trastornos locales de la circulación periférica.

Cuarta observación.—Este caso presentaba antes de ingresar en la cámara todo el cuadro sintomatológico de la fiebre amarilla que hacía esperar un proceso de gran intensidad á juzgar por el pulso y la temperatura, siendo tan acentuada la raquialgia y dolores contusivos generales que hubo que ayudarle á subir las escaleras del cuarto alto donde están las clínicas. Á las 12 horas de estar sometido á la acción del frío el estado general del enfermo era otro, desapareciendo la cefalalgia, disminuyendo mucho la raquialgia; la temperatura había bajado más de un grado y el pulso descendió de 128 á 72, continuando esta disminución de las pulsaciones hasta 60 que marcaba á las 24 horas, llegando á 56 en días sucesivos. La orina no escaseó en ningún día, presentando abundante albúmina. No tuvo ni náuseas ni vómitos y el aparato gástrico apenas revelaba síntomas del padecimiento.

No podemos decir que la enfermedad hubiese abortado, pues la presencia de las cámaras características de borra y la albuminuria, síntomas que persistieron hasta después del quinto día, nos hicieron ver que el frío había indudablemente modificado favorablemente la marcha, aunque no yugulado el proceso por completo.

La convalescencia de este enfermo fué muy rápida, siendo ayudada por los tónicos que se le propinaron desde antes de salir de la cámara y que levantaba sus fuerzas oponiéndose á la depresión circulatoria que desde un principio se manifestó bien claramente.

Quinta observación.—Este caso, como podeis ver, tiene semejanza con el segundo por su benignidad y también podríamos segregarlo si hiciésemos de casos graves; pero, ¿puede negarse fuese fiebre amarilla? En mi concepto no; pues si la albúmina se considera como síntoma patognómico de la endemia, manifiesta estuvo en la orina el segundo día de enfermedad. Por otra parte su conmemorativa nos dice que el enfermo estuvo en la sala 9ª de este hospital y al salir llevaba sin duda el gérmen de la fiebre amarilla, pues á las 36 horas de salir de allá se sintió atacado. Á su ingreso en el hospital presentaba el síndrome característico de la endemia.

Quizás diréis que fuera de la cámara y aun casi sin tratamiento se curaría; también yo lo creo así, que hecha con esmero la asepsia intestinal sería un caso de forma

abortiva de los muchos que con frecuencia tenemos, y que sin embargo conceden inmunidad al individuo. Pero nosotros comprobamos por lo menos que la cámara no le fué perjudicial, y para nuestro estudio algo significa esto.

Sexta observación.—He aquí un caso en que creémos que la cámara ofreció una acción modificadora favorable en el proceso que se presentaba con gran intensidad en los primeros momentos que vimos al enfermo, y que ya dentro del aparato, cediendo esta intensidad de los síntomas aunque sin desaparecer por completo, comprobando su existencia la del proceso amarillo.

Este enfermo tuvo vómitos antes de ingresar en la cámara; no faltó la orina pero no fué tampoco muy abundante, teniendo albúmina en pequeña cantidad pero persistente aun después de salir del aparato. La depresión del pulso y la baja de la temperatura pudo notarse á las 12 horas de estar sometido al frío; confirmándose esta accion que es la más constantemente observada, así como el buen aspecto de la lengua y la falta de fenómenos gástricos.

Séptima observación.—El presente caso fué más parecido al segundo, pues tampoco comprobamos la albúmina, aunque en las primeras orinas emitidas se enturbió el líquido ligeramente con el reactivo de Esbach. La depresión circulatoria fué notable; el pulso en este enfermo llegó también á 44 pulsaciones.

Otra particularidad ofreció que fué el eriotema con picor, producido por el frío que se hizo algo molesto y que desapareció dos días después de salir de la cámara.

Octava observación.—Este caso revistió desde un principio gravedad, modificándose el estado general del enfermo una vez dentro de la cámara, comprobándose la misma depresión del centro circulatorio que en los demás casos, aumentando la secreción orinaria aunque presentaba grandes cantidades de albúmina y un íctero pronunciado.

Llamónos la atención que habiendo manifestado había padecido de frecuentes catarras, con esputos sanguíneos, el frío de la cámara no produjo alteración alguna en su aparato respiratorio y solo un ligero dolor al costado derecho que duró poco, sin que pudiéramos apreciar síntomas torácicos quizás por lo difícil que se hace la exploración de esta cavidad al traves del ventanillo del aparato, pero cuando al salir el enfermo de la cámara pudimos auscultar y percutir con libertad, nada se reveló que indicase hubiese habido hiperemia pulmonar.

Novena observación.—La gravedad con que se inició este caso puede deducirse de los síntomas con que ingresó en el hospital, siendo necesario llevarle en una silla de manos á la enfermería.

El gráfico de su temperatura y pulso indican algo de lo que la autopsia corroboró. Este enfermo tenía una lesión cardiaca anterior á la infección endémica y debemos también creerlo así atendiendo á su conmemorativo, pues dijo que algunos días antes de presentarse la fiebre se sentía enfermo. El proceso amarillo hizo su evolución intercurrente, aumentando los trastornos de la lesión mitral. Los signos miscroscópicos nos explican los fenómenos respiratorios que observamos durante el curso de la fiebre amarilla. El enfermo orinó hasta sus últimos momentos en cantidad abundante, presentando pigmentos biliares y albuminuria.

Si este individuo hubiera sido auscultado antes de su ingreso en la cámara, no lo hubiéramos sometido al tratamiento después de lo ocurrido con el primer enfermo.

La comisión acordó verificar un minucioso reconocimiento del aparato circulatorio en cuantos enfermos se aplicase el tratamiento antes de su ingreso en la cámara.

Reasumiendo: Nuestras nueve observaciones pueden descomponerse en esta forma: 2 casos mortales (primero y noveno), 3 casos graves (tercero, cuarto y ocho), 4 casos benignos (segundo, quinto, sesto y séptimo).

Los dos casos de muerte no podemos, en rigor clínico, considerar que la cámara haya sido perjudicial á estos enfermos. Las lesiones que la autopsia demostró, revelan eran anteriores á la invasión de la fiebre amarilla y en ninguna manera causadas por la baja temperatura.

En los casos graves la terapéutica por el frío dió el mismo resultado que el mejor tratamiento con la ventaja de no cansar el tubo digestivo con medicamentos, proporcionando el descanso de los órganos más influenciados directamente por la infección, favoreciendo por tanto la defensa orgánica.

De los casos que consideramos benignos por la marcha del proceso, puede caber la duda de si fué la cámara la que produjo este resultado ó si fuera de su influencia y con tratamiento bien dirijido se hubiera conseguido idéntico resultado. De todas maneras siempre vendríamos á parar que dentro de la cámara se curan los casos benignos sin más tratamiento que la asepsia intestinal. Preciso sería recojer un gran número de observaciones de casos benignos y hacer un estudio comparado entre los de esta

naturaleza tratado dentro en la cámara y fuera en las demás clínicas para formular una conclusión absoluta.

Quisiéramos analizar los cambios que hemos visto en los enfermos sometidos á nuestra observación para sacar algunas conclusiones finales; pero no podemos hacerlo sino muy ligeramente, por ser muy pocos los casos que hemos visto. Sin embargo no debemos pasar en silencio la sensacion de bienestar que todos los enfermos manifestaron á las pocas horas de su ingreso en la cámara, que atribuimos: 1º á la pureza del aire que allí respiran, 2º á la oscuridad en que se encuentran, y 3º á la disminución y desaparición de la cefalagia, raquialgia y epigastralgia.

El aire que penetra en el aparato al establecer una corriente de más velocidad por el enfriamiento es renovado sin cesar, haciendo que la hematosis sea más completa por la mayor cantidad de oxígeno, así que la respiración se hace fácil, tranquila y sosegada.

La pureza del aire es indudablemente un factor importantísimo en todas las enfermedades, pues como dice Rebeillé-Parisé: "Un aire puro constantemente renovado constituye no sólo el primero de los goces físicos, sino también una de las condiciones indispensables de salud," y sabido es que si en todas las enfermedades es conveniente que el enfermo disfrute de ventilación y saneamiento en el local, es casi indispensable esta circunstancia en los enfermos de fiebre amarilla.

Nuestro compañero, el malogrado Dr. Granizo, que con tanto afán se ocupó del estudio de esta enfermedad, al tratar sobre este punto dice: "Una habitación limpia, ventilada y fresca, lejos del foco de infección, si es posible en el campo, es ya una garantía de esperanza." La Cámara Polar se puede considerar como una pequeña habitación que en alto grado reune esta circunstancia.

No es tampoco de nuestros días el pedir tales condiciones ni el aislamiento, pues ya Lafuente en 1805 nos habla de la instalación de los enfermos en pequeñas barracas al aire libre, en su trabajo titulado, "Observaciones justificadas y decisivas sobre que la fiebre amarilla pierde toda su fuerza contagiante dentro de una choza," y el Dr. Bustos que estudió la epidemia de Canarias de 1862 á 1863, no da menos importancia al aire que rodea á los enfermos en los hospitales destinados á la fiebre amarilla.

Pero el aire que disfruta el enfermo dentro de la cámara es no tan solo puro, renovado dentro de una pequeña casita lejos del foco de infección, sino que su presión es mayor y su estado de saturación establece una atmósfera húmeda y fria que favorece las oxidaciones en alto grado, contribuyendo á despertar mayor suma de actividad en los órganos, aumentando la nutrición y disponiéndoles á defenderse de la intoxicación por las ptomainas que envenenan la sangre.

La oscuridad que reina dentro del aparato no es factor despreciable, á mi modo de pensar, en las modificaciones que el enfermo experimenta. Conocida es la influencia de la luz, cuyas acciones fisico-químicas sobre el organismo han sido objeto de los interesantes trabajos de Lemoine, dirigidos no sólo á investigar lo que la luz es en sí, sino á su manera de actuar como causa de reacciones químicas, combinaciones y decomposiciones, demostrando su influencia en las transformaciones isoméricas de algunos elementos, observando que la rapidez de las reacciones es muy variable según la intensidad luminosa.

La acción del agente luminoso guarda también relación con las temperaturas y así la influencia de la luz sobre determinados cuerpos oxidantes es nula, si las sustancias orgánicas sobre que hacen reacciones no se colocan á temperaturas bajas, en cuyo caso las reacciones químicas se provocan con aceleración

No hacemos más que apuntar estas ideas sin desarrollarlas sobre la acción que puede tener la oscuridad combinada con la baja temperatura, aunque el inventor apenas ha llamado la atención sobre la importancia de este agente en su aparato. Recordaremos además á este propósito el tratamiento del Dr. Gallabardín en la viruela por la oscuridad, empleado desde 1876, indicación que antes había sido preconizada por los médicos ingleses Waters y Gadsden y ensayado en Francia por

el Dr. Patín que ha visto suprimirse el período de su curación en los variolosos cuando la oscuridad ha sido completa é inintermitente.

Recordemos también las curiosas é interesantes experiencias de Downes y Briuntine sobre los efectos de la luz en el desarrollo de las bacterias y otros microorganismos, y no podremos menos de considerar que la oscuridad dentro de la cámara es asunto que merece un estudio esperimental muy detenido.

Además de estos factores de aire puro y oscuridad que creemos puede contribuir sin duda al bienestar de los enfermos sometidos á la Cámara Polar, hay que añadir el frío obrando en el organismo como sedante y á cuya acción debemos referir la rápida desaparición de la cefalalgia, raquialgia y epigastralgia, pues el frío disminuye la presión vascular, causa de las congestiones y de la excitación cerebro-espinal.

Por lo que hace á la epigastralgia hay además otra explicación. Hemos dicho que en todos los casos el estado de la mucosa gástrica se modificaba favorablemente, presentando los enfermos á pocas horas de estar en la cámara la lengua limpia y húmeda sin tener náuseas ni vómitos, coincidiendo este cambio con la depresión del pulso y la regularidad de la respiración. La acción del frío sobre los aparatos gástrico y circulatorio es evidente, y no cabe atribuirla más que á una inhibición del bulbo que ejerce su acción refleja sobre el pneumogástrico por intermedio de la mucosa respiratoria, pues sabido es que la función que en fisiología se asigna al pneumo gástrico no se ejerce sino por vía refleja.

Á esta modificación de la mucosa gástrica no dejará de contribuir también el descanso del estómago durante la permanencia del enfermo en la Cámara Polar, pues evitando el trabajo de esta víscera no se aumenta la flogosis producida por la infección.

Los enfermos apenas muestran deseos de beber, disminuyendo la sed y por consiguiente la digestión de líquidos que es muchas veces la que provoca náuseas y vómitos. La adipsia proviene del estado de humedad de la boca y los fauces por la gran cantidad de agua que en estado vesicular penetra por la respiración. Esta gran cantidad de agua, absorvida por la extensa mucosa del aparato respiratorio, puede también concebirse que pasando al torrente sanguineo diluya en parte las toxinas de la sangre, pero sobre este particular no recuerdo por nuestras incompletas observaciones clínicas, que como pretende el autor, lleguen á producir el verdadero lavaje de la sangre. Para afirmarlo tendríamos que hacer un estudio histológico de este líquido que no hemos llegado á practicar.

No se ha podido comprobar que el frío de la cámara ejerza influencia en el aumento de la secreción renal, pues si bien los enfermos que hemos tratado por este procedimiento todos han orinado con abundancia, esto mismo suceda con enfermos tratados por el método de los antisépticos; y en el primer caso que entró en el aparato ya iniciada la anuria no influyó el frío para que se restableciese ni poco ni mucho la función secretora; y se comprende por la modificación que la glándula renal experimenta en sus elementos histológicos. Los análisis de las orinas, cuando se hagan completos, darán luz sobre este punto tan importante.

Según se ve, poco es lo que la comisión puede informar sobre la acción terapéutica de la Cámara Polar por ser pocos los casos observados, pero creémos que en clínica todo lo que favorezca á los enfermos es de importancia, y aunque sólo se estime el bienestar que produce la atmósfera fría y húmeda de este aparato, es lo suficiente para que el tratamiento del Dr. García merezca fijar la atención del clínico, y que todos estemos interesados en su estudio. Por otra parte es evidente su acción refleja sobre los aparatos circulatorios, respiratorios y digestivos, así que en concepto nuestro es por lo menos un buen medio para colocar los enfermos que coadyuvara con el tratamiento antiséptico hoy empleado con tan buen éxito en las enfermedades infecciosas á la diminución de la cifra de mortalidad, que es cuanto por ahora podemos ambicionar.

¿Existen contraindicaciones en someter todos los enfermos de fiebre amarilla á la acción del frío? Pregunta es esta que no nos atrevemos á resolver por ahora. Sin-

embargo, no hemos visto producirse catarros por el enfriamiento, ni lesiones inflamatorias del aparato respiratorio. Los dos casos de defunción hemos comprobado por la autopsia que teníamos una lesión cardiaca anterior á la invasión de fiebre amarilla, pero necesario es estudiar este particular para formar un criterio exacto.

La convalescencia de los enfermos nos parece que también es más rápida por este procedimiento, siendo de notar los efectos que se presentan á la salida del aparato, pues si el frío es sedante, el calor es estimulante y unido esto á la influencia de la luz después de la oscuridad en que vivió el enfermo, son estos dos elementos, calor y luz, factores importantes de la existencia activa que necesariamente tienen que producir una reacción grande en el organismo; y aunque se hace gradual la elevación de la temperatura no por eso dejará de hacerse sentir su acción en los enfermos al salir al exterior y colocarse en el medio ambiente natural.

Siento tener que hacerme cargo de algún juicio que ha llegado hasta nosotros. Sabemos que se ha censurado á esta comisión, suponiendo que no ha sometido á la acción de la Cámara Polar más que los enfermos de fiebre amarilla de poca intensidad, y aunque no debíamos recojer este cargo, pues no creémos con derecho á juzgar nuestra conducta á los que ni siquiera vieron los enfermos, diremos dos palabras sobre el particular.

El clínico no posee más datos para juzgar á priori de la gravedad del proceso que el síndrome inicial con que se presenta, y si fijamos nuestra atención en los síntomas que presentaron los enfermos cuando hicimos su diagnóstico y los ingresábamos en la cámara, creo que hemos diagnosticado con rectitud, sin que pudieremos formular á priori con certeza un pronóstico favorable ó adverso. Sometimos á la influencia de la cámara el caso segundo que presentaba cierta benignidad aparente en su inicio, pero convencidos de que era fiebre amarilla; y si algunos otros resultaron benignos, todos proporcionaron motivos para estudiar algo de la acción terapéutica del frío del aparato, ya que el resultado final que buscábamos no era la estadística de mortalidad.

El verdadero cargo que puede hacerse á la comisión que representamos es lo incompleto de su estudio. En efecto, no hemos hecho análisis del aire dentro de la cámara ni á su salida del aparato; no se han practicado investigaciones precisas respecto de los elementos de la orina, pues ni la albúmina se ha dosificado en cada uno de los diferentes períodos, cuestión de gran importancia para conocer ó poder explicar alguna de las acciones que se vislumbran en ese tratamiento. El análisis de la escreto-intestinal era un dato interesante necesario que no se ha hecho, las investigaciones en la sangre, las exploraciones esfigmográficas y otras deficiencias que no señalamos por que demasiado se aprecian con la lectura de las historias de nuestros enfermos, y de estas ligeras consideraciones que exponemos nos hacen ver que ha faltado mucho para que la clínica quede satisfecha con nosotros.

Mucho lo lamentamos y solo disculpa que presentamos á la superioridad este informe que consideramos como preliminar, el deseo que la comisión tiene de que se continúe en las experiencias; pues si con escasez de medios, sin recursos para las investigaciones, con tan reducido número de enfermos, se vislumbra alguna acción que puede ser favorable en el tratamiento de la fiebre amarilla, y confirmamos que no es perjudicial el medio á los enfermos, es preciso continuar el estudio; no es posible abandonar ya el camino de la experimentación y entregarnos á la indiferencia.

La comisión aspira al informar ahora deficientemente á que la autoridad superior que inició estos ensayos en el hospital militar, al conocer este resultado incompleto de nuestro estudio, disponga se continúe el ensayo de la Cámara Polar por otra comisión dotada de todos los medios de investigación y análisis necesarios, y en la que tomen parte con el Cuerpo de Sanidad Militar los profesores de la armada, algunos miembros que nombre la sociedad de estudios clínicos y otros de las corporaciones científicas de la Habana, pudiendo contribuir en mucho á los análisis tan necesarios en estas experimentaciones, el instituto bacteriológico como centro que

está pensionado por el Estado, ya que en este hospital no existe el gabinete histo-químico porque todos suspiramos.

No es la primera vez que la sociedad de estudios clínicos y el laboratorio bacteriológico comparten con nosotros en este hospital estudios análogos, y creemos que nunca como en la presente ocasión está indicada á una comisión bien organizada de fiebre amarilla.

Verificados los estudios con más enfermos y en las condiciones que exige la clínica y demanda el progreso de las ciencias, podremos entonces juzgar debidamente del invento del Dr. García, quien también debe imponerse el sacrificio que exige la ciencia á todo autor, y formando parte de esta comisión debe venir á ayudarla con sus indicaciones y á la vez recibir el auxilio leal y desinteresado que prestan siempre los amantes del progreso á los que como él tienen fé y entusiasmo.

Antes de terminar: El aparato llamado Cámara Polar, cuyo nombre hace simpático y hasta sugestivo el tratamiento del Dr. Alfredo García, dada su construcción conforme al modelo que tuvimos en este hospital para los ensayos, ¿Reune las condiciones que se necesitan para hacer el aire aséptico, graduar exactamente la temperatura interior y propocionar al enfermo una atmósfera húmeda exenta de gérmenes morbígenos? ¿Ofrece comodidad para la asistencia de los enfermos? ¿No es por demás molesto y hasta demasiado caro el sistema de enfriamiento? ¿Impulsa su vista al deseo siquiera por salvarse de entrar en el aparato? No queremos contestar á estas preguntas y á otras que nos ha sugerido más de una vez la vista y exámen de la actual cámara, pues las grandes deficiencias que se notan, para cumplir cuanto el inventor pretende, sólo tienen disculpa en ser la confección primitiva del Dr. García traducida en obra por un mal mecánico.

Creemos que las objeciones que pueden ponerse al aparato serán salvadas sin duda por el perfeccionamiento que todo invento sufre á poco de ponerse en práctica. Es más, creemos que quizá el Dr. García no hubiera sufrido aquí algunas contrariedades si el aparato estuviese construido de otra manera, y nuestro deseo de ver comprobadas algún día sus ideas, le aconsejamos que iniciando las reformas consiguientes abandone la actual cámara y construya otra bajo la dirección de un inteligente ingeniero que venza estos inconvenientes dando al aparato una vista más agradable, quitándole su aspecto tétrico y sepulcral, haciendo más cómodo y económico el medio de enfriarlo, pues debe tener en cuenta que no en todas partes hay facilidad de conseguir hielo, que se hace necesario facilitar la observación del enfermo y su asistencia, que hay que impedir que las exalaciones y excreciones del paciente vicien la atmósfera interior, así como también que al salir al exterior el aire infestado sea quemado para evitar la difusión de los gérmenes morbosos.

La comisión no ha dejado de tener en cuenta todo esto, y en su deseo de llenar cumplidamente su encargo, no procedió la construcción de una cámara para el hospital, según estaba autorizada, por no hacer un gasto inútil si había de ser modificado el invento, pero avistándose con el ilustrado capitán de artillería, Don Severo Gómes Núñez, entusiasta por todo progreso científico, logró un proyecto de cámara fría que en nuestro concepto resulta ventajosa y que desearíamos ver en planta en el caso que esperamos de seguirse estas experiencias en el hospital militar.

Puede verse el proyecto que se acompaña á este informe, por el que resulta menos costoso el medio de producir el enfriamiento.

Para terminar diremos que estamos conformes con las últimas palabras que del Dr. García hemos leido en su réplica al Dr. Bangs:

"La electricidad estuvo en manos de todos, y sin embargo Edison fué el afortunado que recojiendo todas aquellas verdades dispersas las transformó en luz, en sonido y en colores," y nosotros diremos que si otros médicos antes de ahora han tratado de aplicar el frío á la curación de la fiebre amarilla sin éxito favorable, quizas al Dr. García esté reservada la gloria de resolver el problema de hacer menos temible la endemia del golfo mexicano, gloria que reflejaría sobre el cuerpo de sanidad militar en cuyas filas ha profesado el inventor de la Cámara Polar." Hé dicho.

Terminada la lectura de este informe el señor presidente levantó la sesión, manifestando que en la próxima podían hacer uso de la palabra los comisionados que no estuviesen de conformidad.

Acta de la Sexta Sesión.

En la ciudad de la Habana á los catorce días del mes de mayo de mil ocho cientos noventa y tres, reunida la comisión bajo la presidencia del médico mayor Dr. José Lanzarot, manifestó este señor que por su parte estaba conforme con el informe leido por el Dr. Extrada en la sesión anterior y deseaba saber si los demás comisionados lo estaban también para disponer se remitiese con las actas al señor Inspector Jefe de Sanidad Militar.

Los Sres. Clairac y Alonzo Cuadrado manifestaron su conformidad, pues tratándose de un informe preliminar no creían se podía exigir más á la comisión que decir lo que se había visto, y que experimentaciones sucesivas darían verdadera luz sobre la importancia clínica del tratamiento propuesto por el Dr. García.

Pedida la palabra por el Dr. Bellver le fué concedida por el señor presidente y dijo: Que después de haber oido el bien redactado informe del Sr. Vocal Ponente recobrando la libertad de crítica que en la reunión primera fué á su juicio desconocida por sus compañeros, por interpretar á la letra la órden superior prescindiendo de las atribuciones de que lógicamente estaba investida la comisión; ha de comenzar por lamentarse de que las observaciones clínicas, tanto por su escaso número y principalmente por no estar informadas en los modernos conocimientos debido á la carencia de medios de análisis, resulten sin autoridad bastante para deducir algo definido y concreto.

La comisión con la autonomía que por su especial índole le corresponde, y con perfecto conocimiento de su cometido, después de examinar la doctrina sustentada por el Dr. García, basamento de su terapéutica, debió haber dirigido una comunicación informe á la autoridad, que con tan plausible celo había ordenado estos estudios, poniéndolo de manifiesto: primero, que las sucesivas idénticas infecciones que el autor supone influenciando el proceso amarillo son de muy dudoso valor ante la bacteriología y desmentidas en absoluto por la observación de los hechos; segundo, que aun dando por buena la desautorizada hipótesis de que parte el medio terapéutico Cámara Polar, resultaba á todas luces ilusorio, pues con su invento en nada modifica la composición bacteriológica del aire que es el objeto que se propone.

Esta patente claudicación sería motivo más que suficiente para negarle los honores de la experimentación clínica; mas teniendo en cuenta una acción á la que el Dr. García da poca importancia, la hiperirradiación calórica á que se sugeta al enfermo, que obliga al organismo á generar mayor cantidad de calorias, movimiento aprovechable en la clínica de las toxo-infecciones para llenar la segunda indicación que en ellas se impone, "favorecer la diminución de los tóxicos microbianos y autótonos," al ser ello tomado en consideración fuera conveniente encauzar las observaciones ciñéndose al plan adjunto, precisándose la adquisición de los medios de investigación que se detallan en la relación que se acompaña (remitir con este informe el plan y los medios que se necesitan).

Ante este informe preliminar la autoridad superior con su reconocida ilustración y buen deseo, haciendo uso de su poderosa iniciativa hubiera dotado á la comisión de los medios precisos para el desempeño de su cometido, patentizándose una vez mas que sin un laboratorio histo-químico y bacteriológico el cuerpo de sanidad no puede, bien á su pesar, resolver ni este ni ninguno de los problemas clínicos que á diario se le presentan, y que todo ello redunda en notorio perjuicio del ejército, que tiene el indiscutible derecho de que se lo defienda sin escatimar los medios, injusta recompensa de sus generosos y no regateados servicios á la patria.

En el informe leido parece revivirse el análisis crítico de la doctrina que inspiró á su autor el tratamiento de la fiebre amarilla por la Cámara Polar, y si en la primera sesión pudo esta comisión sostener que no era de su incumbencia y por mayoría

imponer dicha opinión, hoy no es sostenible y se impone como deber elemental para descartarle de sus espejismos y valorizar lo que valorizable resultó, llevándolo á efecto sin rodeos ni vaguedades, y terminando el informe por un resúmen doctrinal en el que resalta la conformación, la negación ó la duda.

Insiste en las razones expuestas en la primera sesión, y abriga el convencimiento de que el autor de la Cámara Polar se halla en la actualidad plenamente convencido que su concepción patogenésica no es admisible, así como también que el aparato esterilizador de su invención no llena el objeto que se propuso, evitar las infecciones idénticas sucesivas.

Descartados estos espejismos, entra á analizar la acción supuesta al rocío en suspensiva para obtener el lavaje ó lavado de la sangre. Es conveniente recordar que los enfermos de fiebre amarilla manifiestan en general pocos deseos de beber, que hay que incitarles y hasta obligarles para que lo verifiquen, para no dejarse despistar cuando se consigna que dentro de la cámara acusan poca sed ó ninguna; deduciendo de ello que por la mucosa de las vías respiratorias se absorbe inconcientemente la cantidad que el organismo necesita para sus atenciones. Los nueve enfermos han bebido dentro del aparato por indicación de su autor, haciendolo poco más ó menos como si hubiera sido tratados por los métodos ordinarios, y como el Dr. García se felicita de poder dejar en reposo el tubo digestivo, por creer que por dicho medio se sostiene á las necesidades del organismo, hubiera sido de desear que consecuente con su creencia lo hubiera demostrado privando en absoluto de bebidas á sus enfermos.

Los experimentos de Fick y Goldstein desvirtúan en parte las ideas del Dr. García sobre este particular; cuando el centro respiratorio es calentado, se determina una dispnea térmica, que según la expresión de Lorain, es moderadora de la temperatura central, porque entrega una cantidad de calórico á una masa mayor de aire, y provoca el enfriamiento por formación de mayor cantidad de vapor de agua. Se pierde agua por la vía respiratoria por efecto de este esfuerzo regulador de la producción exagerada de calor; y lo que puede advertirse es que aportando el aire aspirado mayor cantidad de agua que se evapora en contacto en la mucosa respiratoria sobrecalentada por la alta temperatura de la sangre, resultan disminuidas las pérdidas que en este concepto habría de sufrir el organismo.

No quiero significar con esto que la mucosa de las vías respiratorias deje de ser una superficie apropiada para la absorción de los líquidos, muy lejos de ello; la concedo un gran poder en ese sentido, siempre que se lleve al árbol aéreo una cantidad más considerable de agua que facilite el enfriamiento, dejando un sobrante que puede ser absorvido; ello podría conseguirse con la pulverización del suero artificial y hasta con la inyección braquial del mismo que bien dirigida podría dar excelentes resultados, sustituyendo la hipodermoclisia y hasta la inyección intravenosa.

Es elemental que todo ser orgánico para conservar su térmica fisiológica, genera calórico en relación con las pérdidas que experimenta por irradiación, siendo esta tanto mayor cuanto más baja sea la temperatura del medio ambiente y más ténue y mejor conductores los vestidos ó cubiertas aisladoras. La acción fisiológica de la Cámara Polar se traducirá por excitación de la termogénesis, aumento en las convulsiones orgánicas y como resultante mayor cantidad de sustancias excrementicias eliminadas; y la acción terapéutica en los procesos toxi-infecciosos por el retraso ó disminución de la auto-intoxicación que el organismo establece, por los trastornos que las toxinas microbianas inducen en el comercio activo de los elementos celulares con el líquido sanguíneo. Dichas acciones deben manifestarse por una poliuria acentuada que dé como resultante una cifra elevada de urea y cloruros.

Aúnque en conocimientos de fiebre amarilla se marcha con un retraso considerable y no se han llevado á cabo con éxito estudios sobre las sustancias de orígen microbiano eliminados por los filtros renales, tanto patógenos como inmunizantes, y nada concreto puede decirse sobre la acción excitadora especial que la Cámara Polar pudiera tener, es lógico suponer por analogía de lo que ocurre, y está comprobado

en otros procesos infecciosos análogos que por los riñones se eliminan solubilizados en la orina, y que este movimiento salvador quedaría favorecido por la mayor intensidad en el proceso de oxidación regresiva. ¿Se ha observado algo en los casos clínicos que pueda servir á la comisión para confirmar los apriorismos que anteceden? La primera observación, que si bien ingresó oligúrico, se hizo anúrico y urémico dentro de la cámara, fuera suficiente para dudarlo; la novena, que si bien eliminara cantidades de orina relativamente satisfactorias en los cuatro primeros días, termina á pesar de ello por urémia con anuria, tampoco lo confirma; y finalmente la segunda, que siendo un caso muy benigno, orinando abundantemente antes de su ingreso en la cámara, se establece inmediatamente después la oliguria, hasta el extremo de convertirse en anuria, tal vez morir urémico á no recurir á los alcohólicos y dejar subir la temperatura del aparato, obliga á la comisión, á pesar de que en los seis casos restantes la secreción renal fué bastante regular, á no pronunciarse en favor de la utilidad de esta acción, estableciendo prudentes reservas.

Que los enfermos comienzan por sentirse aliviados á las pocas horas de su permanencia en la cámara, es un hecho innegable, y así se ha comprobado hasta en los que han fallecido, que pedían les diesen la bata para pasear por los corredores. En general la cefalalgia cede notablemente; los reflejos gástricos se amortiguan, efecto tal vez de la inhibición de los neumogástricos por la acción del frío sobre el bulbo y sobre su recorrido cervical. ¿Mas, estas modificaciones no se observan también en los individuos tratados en las clínicas de este hospital que ingresan con un síndrome alarmante, en que dominan las altas temperaturas, la cefalalgia, raquialgia y epigastralgia cuando la invasión es reciente y se les administra un purgante de sulfato de sosa aún sin hacerles la antisepsia por el anaftol, ceden rápidamente y siguen un curso semejante al de los enfermos de 3ª, 4ª, 5ª, 6ª, 7ª y 8ª observación? Se precisa tener muy en cuenta estas circunstancias por ser las que el autor de la cámara exige, enfermos de pocas horas de invadidos y hacerles lo que llama la asepsia, ántes de su ingreso en el aparato, continuándola por lo menos hasta el siguiente día, mientras las deposiciones no resulten serosas. Desde que los médicos españoles del siglo pasado en Méjico suponían que la génesis de la fiebre amarilla consistía en la presencia de protófitos en el tubo digestivo y concibieron la idea de envolverlos en aceite para aislarlos y lubrificar la mucosa, favorecer su expulsión, hasta nuestros días, si en algo han convenido la mayoría de los clínicos concienzudos, es en la utilidad de los purgantes en los comienzos de la enfermedad.

Los médicos ingleses de las Antillas usaron el calomelano; los franceses el aceite de ricino; los españoles también el ricino y los purgantes salinos, pero la nota más saliente sobre este particular es el tratamiento clásico de los bodegueros, cuando los hombres de ciencia con raras excepciones disputados, por sugestiones de escuela abandonaron las enseñanzas clínicas; los comerciantes, almacenistas y detallistas trataban á sus dependientes dandóles sendos vasos de aceite de almendras con zumo de limón hasta *corromperlos*, es decir, hasta que se determinaban abundantes y numerosos vómitos y cámaras; muchos de estos enfermos así tratados no eran asistidos por los médicos y de cualquier manera no se les llamaba sin préviamente *corromperlos;* se tienen noticias fidedignas de muchas personas respetables que ningún interés tienen para falsear los hechos de que la mayoría se salvaban, y en cambio aseguran que enfermo que trataban los médicos era hombre muerto. Algo exagerada es esta opinión, mas puede asegurar que en los quince años que tiene su destino en este nosocomio militar, ha visto tanto que aún prescindiendo de todo el progreso verificado en génesis y terapéutica del proceso amarillo, se inclinaría á creer á los *bodegueros.*

Consecuente con sus escritos, no puede prescindir de consignar por quinta ó sexta vez que las dificultades para el diagnóstico precoz no existen; que el síndrome conocido, la máscara especial, el colorido de la mucosa de los labios y sobre todo de las encías rojo-venoso con velo grisáceo transparente, fileteados de color más vivo en particular la encía de la mandíbula inferior dan la característica del vómito; miles

de enfermos por él pacientemente observados, tanto de la enfermedad endémica como de las demás manifestaciones febriles, le autorizan afirmar que en ningún proceso que no sea la fiebre amarilla se presente este complexus sintomático y en cambio siempre en ella ha podido comprobarlo desde las cinco ó seis horas que siguen á la explosión inicial; la comisión no ha tenido dudas en los casos observados.

Otro punto que le conviene rectificar es el relativo á la gravedad suma que revisten los casos que han sido invadidos en este hospital, especialmente los procedentes de las clínicas 9ª, 11ª y 12ª, ó sean como se consigna en el informe, "Salas de cirugía oftálmica, venerea y cutánea" sin que se entienda por ello que trate de rebajar en nada el pronóstico del 1º y 9º caso que fué el primero en formular: No negará que existen focos más virulentos que otros y que las fatales condiciones de intoxicación del hospital militar de la Habana hacen suponer con sobrada razón que el letal micro-germen debe ser de virulencia reforzada; mas si se estudia la historia íntima de los casos de fiebre amarilla aquí adquiridos por los enfermos de las dichas clínicas y por el personal tanto militar como civil que presta sus servicios, resultaría que la gravedad ó benignidad está en razón directa de estos dos factores: 1º, tardanza ó prontitud de la intervención terapéutica, y 2º, terapéutica ciega ó racional. El año 1888 las clínicas 11ª y 12ª de 1º de enero á 30 de junio con cuadruplo número de enfermos de fiebre amarilla que la 9ª y 10ª dieron una mortalidad representada por dos y doce respectivamente. Los siguientes años hasta el día corren parejas la 9ª con la 11ª y 12ª, gran mortalidad en los casos en ellos adquiridos; la 10ª se ha sustraido al anatema. Desde el 1890 es muy raro enfermero que muera, sanitarios ningunos aunque de ámbas clases han sido muchos los invadidos. Examinad las hojas clínicas y os dareis cumplida cuenta el porque de esta benignidad y aquella gravedad; raro el caso que afecta la forma grave y aún así raro el que tiene fatal terminación cuando se trata pronto por los purgantes salinos, antisépticos é hiperoccidantes, raros los que terminan favorablemente cuando las sales químicas, la cafeina y otras sutilezas terapéuticas dejen sin influencia el proceso toxi-infeccioso en su primera etapa, pues aunque luego al ser trasladados los enfermos á las clínicas médicas se intente el tratamiento racional, son en su inmensa mayoría casos mortales. En el seno de la comisión, presidiéndola en estos momentos existe quien está en el deber, por ser el jefe de las clínicas 10ª ó de comprobación y oftálmicos y de la de observación de dementes, de ratificar ó rectificar las observaciones que sobre este punto deja expuestas.

Opina que hubiera sido pertinente que el Sr. Extrada hubiera presentado englosados y desglosados, con arreglo al diario clínico de su ingreso, los enfermos que de la enfermedad de que se trata se han transmitado á las demás clínicas de este establecimiento durante el lapso de tiempo en que la Cámara Polar ha sido ensayada. Estos datos comparativos tendrían una importancia tal que no pueden pasar desapercibidos á su reconocida pericia aún en el supuesto como dicen de no ser objeto de la comisión formar estadística. Por lo que á él particularmente concierne, tuvo especial cuidado de señalar dos ó tres casos, testigos á cada observación de la cámara como les consta á todos sus distinguidos compañeros de comisión y el mismo inventor Dr. García, y de los diez y nueve enfermos testigos graves y gravísimos no hubo que lamentar ningún fracaso siguiendo el tratamiento que tuvo el honor de proponer en 1888 y que para su estudio fué nombrada una comisión del cuerpo por la autoridad superior de esta Isla, de la que también es vocal, que por cierto todavía no ha pensado haber llegado el caso de emitir informe apesar del tiempo transcurrido y el respetable número de enfermos tratados por dicho método terapéutico, á la par que por otros distintos, otro número también considerable.

En resúmen, siénta las siguientes conclusiones:

Primera.—La comisión por falta de elementos y escaso número de enfermos no ha podido cumplir con su cometido científico.

Segunda.—La concepción patogénica sugestiva de la Cámara Polar es muy dudosa bacteriología y desprovista de verosimilitud ante la observación de los hechos en lo que se refiere al proceso toxi-infeccioso "fiebre amarilla."

Tercera.—La temperatura de la Cámara Polar no modifica la composición bacteriológica del aire contenido en el aparato y la atmósfera que en él respira el enfermo no es antiséptica ó aséptica en relación con la que rodea á dicho aparato.

Quarta.—El lavaje de la sangre por el rocío que pretende es absorvido por la mucosa respiratoria es muy problemático, dado el mecanismo físico-patológico de la respiración, y sobre todo no ha sido comprobado.

Quinta.—Se ha observado un relativo bienestar del enfermo que puede ser atribuido tanto al aumento de las oxidaciones regresivas cuanto á la acción inhibitoria ejercida sobre los néumogástricos si bien resulta algo debilitada esta noción por sugetar á los enfermos préviamente á la por el autor llamada asepsia, que puede explicar en gran parte ese bienestar por el barrido de los micro-gérmenes y sus tox-albúminas como se observa fuera de la cámara.

El señor presidente manifestó que por lo que hacía á la alusión que en su discurso le había dirigido el Dr. Bellver asentía por completo á lo que había expuesto respecto á la mortalidad de los atacados dentro del hospital, pues creía que en fiebre amarilla lo principal era atender prontamente al enfermo y no cabía duda que dentro de las clínicas, cuando alguno era invadido, también era más rápidamente asistido, y que si el Dr. Estrada había consignado algo en contrario sería por que no en todas las clínicas se sigue el tratamiento tan ventajosamente reconocido de la terapéutica antiséptica. Invitados los demás señores para hacer uso de la palabra:

El Dr. Estrada dijo que no quería prolongar la discusión, y que creía debía mandarse el informe leido en la sesión anterior y lo expuesto por el Dr. Bellver en la presente que constituía un voto particular muy respetable pero que venía á apoyar la expresión del dictamen de la comisión que era en resúmen interesar á la autoridad superior de la Isla para que se continuen los ensayos de la Cámara Polar, dotando á la comisión de toda clase de recursos para investigar á conciencia, si el tratamiento del Dr. García merece ocupar el lugar que el autor pretende en la terapéutica de la fiebre amarilla.

Acordado así se dispuso remitir las actas al Exmo. señor Capitán General por conducto del señor Inspector Jefe de Sanidad de la Isla.

In closing the meeting of the section the executive president said:

GENTLEMEN: We have reached the end of our programme, and I want to say to you that I have been very much gratified to see so many medical officers of the Army and Navy and others of our friends who are interested in the subject of military medicine and surgery. I have been disappointed in not seeing as many ex-members of the volunteer service and the national guard as I had hoped for, but I think we can congratulate ourselves upon having a pleasant and profitable meeting. The section will now adjourn *sine die*.

SECTION VI.—RAILWAY SURGERY.

Honorary Presidents.

Dr. F. K. Ainsworth, Los Angeles, Cal.
Dr. De Witt C. Bryant, Omaha, Nebr.
Dr. J. M. Dinnen, Fort Wayne, Ind.
Dr. W. G. Galbraith, Omaha, Nebr.
Dr. G. L. Hoege, Fostoria, Ohio.
Dr. Jabez N. Jackson, Kansas City, Mo.
Dr. Willis P. King, Kansas City, Mo.
Dr. J. B. Murdoch, Pittsburg, Pa.
Dr. J. B. Murphy, Chicago, Ill.
Dr. A. J. Mullen, Michigan City, Ind.
Dr. G. J. Northrup, Marquette, Mich.
Dr. W. R. Nugent, Oskaloosa, Iowa.
Dr. J. W. O'Conner, Denver, Colo.
Dr. W. B. Outten, St. Louis, Mo.
Dr. R. Harvey Reed, Mansfield, Ohio.
Dr. C. B. Stemen, Fort Wayne, Ind.
Dr. A. A. Thompson, Waxahatchie, Tex.
Dr. S. S. Thorn, Toledo, Ohio.
Dr. W. S. Weissinger, Hernando, Miss.
Dr. B. F. Wilson, Slater, Mo.
Dr. Geo. W. Griffith, Louisville, Ky.

Executive President.

Dr. C. W. P. Brock, Richmond, Va.

Secretaries.

Dr. E. R. Lewis (English-speaking), P. O. Box 255, Kansas City, Mo.
Dr. Pirovano, Buenos Ayres, Argentine Republic.
Dr. T. G. Roddick, Montreal, Canada.
Dr. Hernandez, La Paz, Bolivia.
Dr. Francisco C. Guzman, Santiago, Chile.
Dr. Regino Gonzalez (Cordovanes No. 4), City of Mexico, Mexico.
Dr. Juan J. Ortega, Guatemala City, Guatemala.
Dr. H. McHatton (Spanish-speaking), Macon, Ga.
Dr. Abraham Aparico, Bogota, Republic of Colombia.
Dr. Lucas A. de O. Catta Preta, Rio de Janeiro, United States of Brazil.
Dr. Lino Alarco, Lima, Peru.
Dr. José Pugnalin, Montevideo, Uruguay.
Dr. Pedro Maria Garcia, Caracas, Venezuela.

ADDRESS BY THE PRESIDENT OF THE SECTION, DR. C. W. P. BROCK, OF RICHMOND, VA.

Gentlemen: We are here to-day in compliance with the behests of the promoters of this, the first Pan-American Medical Congress, to contribute our share to this great undertaking. From the time that I found myself assigned to the position of executive president of this section to the present hour I have exerted myself to make it a success, and while the number of papers presented is not as large as I had hoped, yet I am led to believe that what we lack in this regard will be more than compensated for in the excellence of those on our programme.

The action of the organizers of this congress in assigning railway surgery to a separate section has been questioned. While we do not claim for railway surgery

that distinctiveness as a specialty that attaches to some of the other branches of our profession, yet there are peculiarities enough to have called for the organization of one of the largest surgical associations in existence, and the work that this body has accomplished fully attests the ability and zeal of its members and their wisdom in its organization and maintenance.

The work of the railway surgeon is threefold in its nature. His first and paramount duty is to the injured placed in his care. These should receive prompt, unremitting, and skillful attention at his hands; then the public have a right to expect such cooperation on his part with other railroad officials and employés as will secure to them sanitary passenger cars and an abundant supply of healthful drinking water; and, thirdly, the railway companies expect his aid in protecting them from the unjust claims made upon them by the malingerers, and "their name is legion."

The scientific portion of our work is that which will engage our attention during the session of this congress, and I doubt not that it will be observed that experience, the great and almost only teacher, will add many new facts to the sum of our knowledge hitherto attained. And when I remind you that for the year ending June 30, 1891, there were 33,881 injured on the railways of the country, you will appreciate the fact that the experience of the railway surgeons has been, unfortunately, very large.

I learn that the present progressive Surgeon-General of the Army, Dr. Sternberg, has very wisely organized a course of instruction for the recently appointed members of the Surgical Corps of the Army, the better to fit them for their prospective work. Now, if this be necessary in this service—and the action of the Surgeon-General has been universally commended, as far as I have observed—how much more imperative is instruction in regard to the care of the injured on railways let the 33,881 unfortunates answer. Until the schools of the country (and there is no lack of them) are brought to a realizing sense of the importance of railway surgery and the proper care of the injured and make it a part of their course of instruction, we have to rely on the information gained from the various organizations of railway surgeons for our guidance. Railway surgery is the emergency surgery of our time, in comparison with which the casualties in the Army in time of peace sink into insignificance.

But it is idle for me to speak to the members of this section on this subject. Each one of you is as familiar with it as I am, and as fully appreciative of its importance. Railway surgeons and railway surgery are here, and here to stay, and those managements that have organized surgical corps do a vast deal for the prompt and efficient relief of suffering humanity, and he is best fitted to do railway surgical work who profits by his own and the recorded experiences of others. If we continue on the line we have marked out for ourselves, namely, placing under contribution all attainable information, and utilizing it, and giving to the world the knowledge we acquire by observation and experience, we will achieve success, because we deserve it.

Many of the most useful chapters of the surgery of the future will be written by the railway surgeon, as he must be, par excellence, authority upon emergency surgery and all that pertains thereto.

In an address which I had the honor to deliver a few weeks since at the meeting of the National Association of Railway Surgeons, held at Omaha, Nebr., I there called attention to the subject of inland quarantine and the connection of the railway surgeon therewith. We are again hearing the mutterings of the impending storm. This time it comes to us, not from beyond the Atlantic, but from the threshold of our own country. I learn from the daily press reports that the Surgeon-General of the U. S. Marine-Hospital Service is now engaged in investigating some recent cases of supposed cholera occurring in Jersey City. Knowing as we do that epidemics follow the lines of travel, what set of men can be so utilized to prevent the spread of epidemic diseases along those lines as the railway surgeons? And

while they, acting in conjunction with the national, State, and municipal quarantine authorities, will prove a great power in preventing the spread of epidemics along the lines of travel, they will at the same time be powerful factors in preventing ill-timed and useless interferences with the traffic of the roads by the various health authorities along their respective lines.

But, gentlemen, I do not intend to inflict upon you a "formal address," as announced in the programme. I can not imagine how our excellent secretary-general was led into such a misstatement. He has made so few mistakes that I am not inclined to hold him responsible for this. Seriously, gentlemen, whatever of success may attend this, the first Pan-American Medical Congress, much of the credit therefor is fairly ascribable to the indefatigable and intelligent labors of our secretary-general, Dr. C. A. L. Reed, of Cincinnati, Ohio, and I shall take great pleasure in conveying to him an acknowledgment from this section of our appreciation of his great work and congratulations upon its success.

PAPERS READ BEFORE THE SECTION.

REPORT OF A CASE OF SEVERE COMPOUND FRACTURE, WITH REMARKS.

By Dr. JABEZ N. JACKSON, of Kansas City, Mo.

In the experiences of railway surgery there is probably no form of injury of greater interest or importance both to the surgeon and the patient than the various degrees of compound fracture. Such is the nature of the ponderous force which produces most of the injuries in this special line of surgery that compound fractures are perhaps even more frequent in occurence than simple fractures. Comminution and complication are also usually present, until the successful management of these cases will probably test the surgeon's judgment, and ofttimes patience, as much as any injury in the whole field of surgery. Before the days of asepsis and antisepsis to sustain a compound fracture of an extremity usually meant the loss of that member. Thanks, however, to modern technique, we are now enabled to successfully cope with most severe cases, and many are the limbs to-day saved for years of usefulness which a few decades ago would have been unhesitatingly offered at the shrine of immediate amputation. The following case, which I beg leave briefly to report, illustrates what can be accomplished, with a little patience and perseverance, under the application of modern methods.

Case.—Jordan Hicks, age 30, an employé of the Diamond Brick and Tile Company. This company manufactures a form of vitrified brick which is extensively used for street paving, etc. The clay from which their brick are made is found in the form of a shale, almost stony in hardness. Before this clay can be made into brick it has first to be reduced to a powder, when it is then mixed with water until a pliable clay is produced which can be molded into appropiate shape. For the purpose of crushing and pulverizing the stony clay an immense steam crusher working in a revolving pan is employed. On the afternoon of January 23, 1893, while the crusher was stopped, Jordan went down into the pan to clean it out. The engineer not knowing he was there started up the crusher. Jordan at once made an outcry which was heard by the engineer and the machine was stopped as soon as possible—in time to save his life, indeed, but not until his right leg between knee and ankle had been caught beneath the crusher and an extensive compound comminuted fracture produced.

Upon being telephoned for I drove out to the works, about 10 miles distant, where I found the patient stretched out in a dirty and dingy one-room hut occupied by

about a dozen of the laborers. Knowing that it would be futile to attempt treatment here, I contented myself with a cursory examination, and after washing out the wound slightly, applied some gauze and cotton, adjusted a temporary splint, and put the man in a wagon to be brought to the city. On reaching the hospital I made preparations for more minute examination under anæsthesia, and amputation if necessary. I found the following condition: The right leg had evidently been caught by the descending revolution on the inner side with a somewhat slanting force, the outer side being but slightly injured, while the soft parts on the inner side were almost torn off. The line of laceration began about 2 inches above the inner malleolus, followed along the crest of the tibia to the junction of the upper and middle thirds, then curved downward and backward on the inner side to a point just behind the insertion of the inner hamstring muscles. Nearly all the inner aspect of the limb was laid bare, the soft parts being stripped off as the lightning strips off the bark of a tree. The tibia was entirely denuded of periosteum for at least 6 inches, and at the junction of the lower and middle thirds had sustained a much-comminuted fracture. I could pass my finger between the posterior surface of the tibia and the muscles for some distance; also between the gastrocnemius and soleus muscles which were torn apart, and between the gastrocnemius and integument behind. All these parts were severely contused, or rather crushed, and the whole surface was full of dirt and clay, which had literally been ground into the tissues. My consultants advised immediate amputation at the junction of the upper and middle thirds. I observed, however, (1) that the outer side of the leg, where is situated the anterior tibial artery, and also the posterior aspect with the posterior tibial and its branches, were but little injured, thus fortunately preserving and insuring good nutrition of the parts; (2) the man's general condition was good and would warrant conservative delay.

On the other hand was the certainty of some sloughing; the possibility of sepsis; an extensive surface of bone completely denuded and open to necrosis; a fracture thoroughly exposed, with consequent possibility of non-union; a large area to be healed by granulation; and, lastly, a long and tedious course of treatment even if ultimate success were possible.

But the value of a limb is not to be estimated by time or labor, and knowing that amputation could be made as well later should conservatism fail, I determined to at least make an effort to save the limb. I therefore proceeded to cleanse the wound as thoroughly as possible, removing loose spiculæ of bone, curetting out embedded clay and dirt, and thoroughly irrigating and scrubbing the entire limb from knee to toes. In order to lessen the area of exposed surface I produced partial coäptation of the soft parts by strong silk sutures, considerable tension, however, being required. What hemorrhage was present, and fortunately there was not much, owing to the unimpaired integrity of the larger vessels, was controlled by hot-water irrigation or ligation. After closing the laceration as much as possible, the fracture was carefully adjusted, antiseptic gauze and cotton were applied, and finally a strong plaster of Paris cast from the toes to above the knee.

On the second day the cast was fenestrated, which, indeed, meant the removal of nearly all the inner side, but the other dressings were not disturbed. On the fourth day an elevation of temperature led me to remove the dressings, when I found some pus and beginning slough. The wound was irrigated, as well as was possible in the cast, every day for about a week, when, to hasten detachment of the area of sloughing and produce exosmosis, I did what may seem strange in statement; that is, "poulticed the fracture" with boiled, carbolized, flaxseed poultice. The result was beautiful; my wound was soon clean, and healthy granulations at once sprung up. My forced coäptation had lessened the area for granulation nearly one-half, but still I had a surface nearly as large as my hand. Of the tibia about 3 inches, including the seat of fracture, were still exposed, thus affording me the unusual opportunity of inspecting the process of bone repair, which, I may add, proceeded

as rapidly as could be expected even in a simple fracture. After the area of sloughing had been made clean and healthy, I returned to ordinary aseptic or antiseptic dressings. The granulations springing from the soft parts gradually spread over onto the bone, until at the expiration of ten weeks union was firm, all but about one square inch of bone was covered with granulations, and the skin growing from the sound margins, about one inch in each direction, had reduced the raw area fully one-half or more.

From here on the process was more slow and tedious as nature had nearly reached her limit. The plaster cast, which, by the way, had to be newly applied a number of times on account of weakness from fenestration and the moistening from irrigagation, was now dispensed with entirely and attention turned to the wound alone. Gradually the granulations filled up to the level, and the skin pushed out as far as possible and then stopped. I now began to encounter some trouble at a point just below the seat of fracture, where the tibia began to undergo peripheral necrosis or exfoliation, no indication, however, of medullary trouble. I found it necessary to use the curette quite frequently and removed a number of small spiculæ of bone. Still the granulations refused to cover this surface of about one-half inch square, and it was only after nearly two months' persistent curetting, not extensive, however, and the use of general tonics and local stimulants, that finally, a few weeks since, I got rid of all the caries, and the process of granulation was renewed. I would, perhaps, have hastened the progress had I, under anæsthesia, laid the part open and thoroughly scraped out the diseased area. As, however, the patient was getting around as he pleased and did not want to return to the hospital, I contented myself with this slower method. In conclusion, I may say that I now have, practically, a simple area of granulation about one inch in width by four inches in length, which I expect to skin-graft at once, and then my work will be done. A tedious case, indeed, but a good limb, strong as the uninjured member, is worthy of much time and labor.

TORSION AND THE HOMOLOGOUS OBTURATION OF DIVIDED ARTERIES.

By THOMAS H. MANLEY, A. M., M. D., New York.

During the past summer (1893), at the Omaha City meeting of Railway Surgeons, my good friend Dr. J. B. Murdock, of Pittsburg, suggested that if an opportunity offered during the summer, I would favor him, if I could do some experimental work on the larger arteries of the lower animals, with a view of determining, as far as possible, the general applicability and utility of torsion on the divided vessel.

But the interval since that meeting and the present one being short, and being handicapped by many other duties, and meeting with certain unexpected difficulties, my efforts to comply with the request and present something for this section have only been in a very limited measure successful. Nevertheless, though I have had an opportunity to accomplish but very little on the lines intended, yet the yield to my mind has been most fruitful in suggesting what may yet be accomplished in the way of effecting speedy, safe, and permanent obturation of a divided artery, without the employment of a manufactured ligature of any description whatever.

The question of prompt and effective suppression of hæmorrhage is an all-important one to the surgeon, whose duties often bring him in contact with such serious railroad traumatisms as entail an extensive mutilation of the soft parts, with more or less destruction of the larger vascular conduits. Hence, as an elementary study, as it were, that concerning the subjugation of hæmorrhage occupies a position of paramount importance to one dealing with this department of surgery. Therefore, both by study and practice, a full and useful knowledge of the principles which underlie hæmostasis should be sedulously cultivated.

As our art is one without finality, he who would keep abreast of the times and give his patient the benefit of the latest and the most effective therapy must needs continue in a ceaseless search for that on which the least improvement can be made.

Recent advances in wound treatment, aseptic measures, absorbable ligatures, the elastic constrictor, and improved material for dressing have all contributed to radically revolutionize views and methods which until recently had the support of dogmatic principles.

Cellular pathology, the studies of bio-chemistry, morphology, and histology have struck a smiting blow at previous doctrines on the definite occlusion of arteries. Animal experimentation has been an enormous aid in this line of investigation. It has been recently demonstrated that the rupture of the internal coat is not essential in the application of a ligature. (Ballance, "On the Ligation of Arteries in Continuity.")

It has been proven, too, by the same author that the clot is a foreign body in the vessel, and does not undergo transformation into cellular tissue, as was formerly taught, but that the cellular infiltration is from the inner surface of the intima, which, though normally permeated by no capillaries, in the event of injury possesses the property of active cell proliferation.

It has been found that an absorbable, assimilable ligature, amply powerful to occlude the largest arterial trunks, may be safely imbedded in the tissues, when it is properly prepared; to subsequently soften, liquify and be consumed by the phagocytes.

It has been further shown that simple approximation, without the division of the internal coat, is ample in the application of a ligature to effect permanant cicatrization.

Prof. Murdock and others have permanently dammed back the arterial current by the application of torsion, entirely dispensing with the ligature.

Esmarch's constrictor can not be denied an important place in the therapy of hæmostasis, though all must admit that by its careless, injudicious, and too general application it has worked great damage and has caused the needless sacrifice of many limbs and lives which might have been spared without it.

But the possibility of its employment has taught us a useful lesson.

It has demonstrated that the arteries may endure severe and protracted pressure without serious detriment to their integrity, and that the living current will long linger within the lumen of an artery without coagulating and plugging it. But the severe pain which its pressure always entails is a warning to us that its general application is not without that danger.

Acupressure, acutorsion, and many other expedients have been alternately praised and condemned.

In a communication presented to the New York State Medical Association in 1889 (transactions of same year), I described what I designated the "Temporary Transfixion Ligature," a simple and effective means by which any of the arteries of the extremites, large or small, could be promptly and safely controlled. Since then Wyeth, of New York, and Senn, of Chicago, have each devised special methods to control hæmorrhage in hip-joint amputations; both of which, in certain respects, combine the principles of my ligature, the former employing steel skewers and the latter employing elastic tubing. At an early date I hope to again call the attention of the profession to this expedient.

Thus we see that many and various have been the measures employed to subdue arterial hæmorrhage, and, that recent advances in our knowledge of the modus operandi of the healing of arteries and prevention of sepsis, permit us to apply measures heretofore quite inappropriate.

But the ideal is yet to be attained. The materials at our command even now are, in a large measure, unsatisfactory. All dead substances are unsatisfactory. Perhaps catgut is the most valuable when it can be secured fresh and is properly prepared, though often it is a source of infection. It may slip, stretch, or melt down before definite closure of the vessel is secured. Over the openings in small vessels, unless other tissues are included in the ligature, it is prone to slip off; so that it can not be said to hold well except on medium-sized vessels. Kangaroo, rat tail, horse hair, and silk are all objectionable because of their irritating qualities.

Finding all heterogeneous materials more or less objectionable, and becoming better acquainted with the hæmostatic properties inherent in the arteries themselves, surgeons turned their attention to what might be accomplished by the utilization of the damaged segment of the vessel and the adjacent tissues as material which might be utilized for the arrest of bleeding from arteries.

It had been observed that a very troublesome hæmorrhage might follow the mere puncture of an artery, but that when it is cut cleanly across it immediately ceases. Vessels caught in the jaws of an artery forceps and held for a few moments often promptly cease spurting when this is released. This, however, will not succeed in

closing a vessel in continuity unless the pressure is continued over considerable time and a thrombus has formed at the proximal end. It has been often noticed that bleeding is seldom abundant from a large artery when a limb has been shot or torn off.

A wounded artery is essentially a structure seriously, if not totally, curtailed in function, blood circulating through it only under difficulties. All the tissues superjacent or contiguous to it become inflamed and contract down on its walls; the vessel itself, after division, retracts within its sheath. The intima so coils on itself as to form a cuff of soft, filmy tissue, which, with the embolus, for the time at least, effectually aids in the arrest of hæmorrhage. It has been claimed by Ballance, Ziegler, Corneil, and Ranvier that an embolus forms no essential part in the reparation processes of a divided artery.

My own observations incline me to the same view; for I wholly agree with those who regard the clot as always the result of septic infection, and, as Ballance so aptly puts it, "as much a foreign body in an artery as in the stump of an amputation." (Ballance and Edmunds, "Ligation of Arteries in Continuity," p. 127).

There is every reason to believe, then, that auto-hæmostasis is practicable when the secret methods by which it is to be made efficient and practicable are revealed. A long step in this direction was made when methodical asepsis became an accepted principle in wound treatment. Baumgartner and Bottcher declare that no thrombus is ever formed if the vessel heal without suppuration. (Ballance and Edmunds, pp. 156, 157.)

Perhaps it is not sufficiently borne in mind that the various arteries of the body possess wide anatomical and physiological differences, and undergo certain definite changes at different stages in life, and that later researches by more accurate and precise means than we now command will show that there is a difference in the innate recuperative power, not only of various organs and parts, but in special elements of the same viscus or member.

Dr. Murdock, after a careful survey of the history and principles of hæmostasis and a long and ripe experience in general surgery, returned to first principles with a strong conviction that with the aids which modern science have placed in our hands the homologous occlusion of arteries as a general method in the hæmostasis of traumatisms was feasible and practicable; therefore, he recommends the revival of the torsion of arteries on a large scale.

In Warren's late work on the "Healing of Arteries" he tells us that Kocher, of Hamburg, related to Velpeau that he had not ligated an artery for twenty years, and that Velpeau himself was a strong advocate of torsion. The safety of torsion, he thought, depended on three things, viz., the twisting of the external coat, retraction of the internal, and the coagulum. Ogston says ("The Properties of Arteries and their Ligation," p. 117) that the normal blood pressure is from 3 to 8 pounds to the square inch, and that the twisted vessels possessed less resistance than one ligated.

I had but shortly cogitated seriously on this line of experimental work, which had been confided to me by Dr. Murdock, when it occurred to me if the blood current can be arrested through an artery by a twist of it, why not by a knot? In other words, why not tie an artery with its own elements and therewith commit it to the grip of its own living walls, as well as occlude the vessel by turning it on its own axis?

With a determination of testing the practicability of torsion and homologous ligation, I commenced a series of experiments on the dog, and as far as an opportunity offered extended my observations on the human being; but I regret to say that since I commenced I have not had an opportunity to test this expedient on any of the larger vessels of man, and, because of many difficulties which will be removed later, I was unable to conduct my work with entire satisfaction on the dog.*

In the present instance my aim will have been accomplished if I succeed in simply calling attention to the possibilities in the future of securely occluding the bleeding orifices of arteries without the employment of any sort of foreign substance to embrace the artery; by torsion when the cleavage of the vessel is on a line with the surface of the divided tissues, and by homologous ligation of the vessel by means of its own walls in those extensive mutilations in which formerly the surplus vessel was sacrificed with the other tissues. It had occurred to me whether or not in many we might not utilize a ribbon of the intermuscular fibrous septum, the aponeurosis, or other fibrous tissues for this purpose.

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*On the 12th December, 1893, at Harlem Hospital, I was permitted an opportunity to test the homologous ligature, for the first time, on the femoral artery of a boy of 14. The limb had been crushed, above the knee, 3 inches. The slack end of the torn artery was isolated and tied twice on itself. No secondary bleeding followed and boy recovered. T. H. M.

OPERATIVE TECHNIQUE IN TORSION OF THE ARTERIES IN EXPERIMENTAL PROCEDURES.

Only the larger arteries were sought for.

The superficial femoral, having been exposed and lifted out of its sheath, was seized between two clamps and divided with the scissors directly across its long axis. There was an immediate separation of more than a centimeter of the ends. The proximal end was put on an extreme tension, when a second forceps was applied about two centimeters from the one which held the end. Now the segment of the vessel was again stretched, when it was twisted until its outer superficial fibres were seen to rupture. A fine suture was carried through the outer coat of the free end, to leave *in situ* for the purpose of drawing down the vessel in the event of torsion failing. The vessel was then liberated, when its twisted end disappeared in the tissues. There was no hæmorrhage. The proximal end of the vessel having been safely disposed of, the distal was now taken up. Immediately on removing the clamp, which had held the orifice in a tight grip for ten minutes, blood spouted through the open end with great energy. The clamp was reapplied in the same position, with another a little more than a centimeter further down, when the vessel was treated as the preceding, with the same result.

The common carotid on another dog was treated by torsion, which failed at the proximal end. I have tried this experimentally on no other arteries thus far. But since taking up this study I have generally employed nothing else as a hæmostatic agent in occluding those smaller bleeding vessels divided in abdominal and all surface operations.

The very few imperfect observations which I have made thus far on hæmostasis by torsion have convinced me that this is an expedient of great value in appropriate cases when all its details of technique are fully carried out.

It would appear that it is especially valuable in those small vessels with thick coats of yellow elastic tissue. When these are imbedded in muscular tissue torsion should wholly supplant every description of ligature.

But there are many sets of arteries which form channels for themselves in the tissues through which they pass, as those of the scalp, the palmar surface of the hand, and the plantar surface of the foot, in which the vessels' coats and sheaths are so intimately incorporated with the part through which they pass that they do not permit of sufficient displacement forward and outward to allow of ample twisting for effective occlusion.

Enough has not been accomplished from experimental and clinical observations to enable us to estimate just how far torsion is a practicable and useful expedient in the obturation of the major arteries, though much has been written on the subject. A definite and precise manual is essential in the performance of torsion.

The bleeding orifice must be seized separately from other tissues. Gradual but considerable tension must be made on the free end of the vessel in order to clear it from adhesion with adjacent tissues, and besides to put the longitudinal fibers on a full stretch.

Now a second clamp seizes the vessel at its uppermost point, while a rotary motion is commenced below. When the twisting is carried to the point of rupturing the outer coat, then the forceps last applied is removed and two or three more turns are given the end of vessel. The latter is once more slightly stretched, we let go and the stump of the vessel disappears in the tissues.

Now, in order to give support to the mangled artery and provide against secondary hæmorrhage, it is always well to carry a light catgut suture through the tissues in which the crushed end of the artery is embedded. In young people the collateral tributaries are so abundant that the distal end of the vessel must be effectually sealed before we finally close the wound or complete the dressing. Now, the smooth, firm bandage is placed over an abundance of aseptic, fluffy dressing, with the limb, stump, or part in a comfortable position, the patient is placed on a proper regimen. As to intestinal and respiratory aliment, nature will promptly do the work of repair, and it may be said that in many cases the primary dressing, so called, need not be disturbed until the healing processes are complete.

This is the ideal to which we all should aim, but it is practicable and safe only under favorable circumstances. In order to realize it, every facility must be within easy command. Our patient must always be placed in complete and permanent physiological rest until the healing processes are consummated.

Homologous ligation.—Oftentimes in the course of our studies, research, experimentation, and clinical observations a new idea flashes through our minds, and at once, perchance, we imagine we have made a discovery.

There are to-day, remarkable to say, many who firmly believe that Harvey discovered the circulation, while admitting that centuries before this profound investigator was born the properties of the arteries and veins were well understood; and so there are others who would give all the credit of pulmonary physics to Lannaec, and

besides proclaim that Lawson Tait was the first to discover purulent masses in the Fallopian tubes. But it is said that "there is nothing new under the sun" and surely enough soon after one has come forth and vaunted his new discovery and feels himself safe as the sole recipient of its honors, great is his chagrin to learn that there is nothing original in his contribution; and that it had long since gone into oblivion because it possessed no practical value, and was hence cast aside as useless.

Is the same fate in store for the "homologous ligation of the arteries?"

Is there anything new in the principle in utilizing the waste or exc ss of a vessel to close its own lumen?"

Is there anything original in the utilization and appropriation of a living ligature to close a vessel?

Has this an application to other organic elements and structures besides the blood vessels? Does the theory rest on a substantial rationale?

And, lastly, have others given this procedure a trial?

Bone we know can only undergo repair or reproduction by bone. Destroyed integument can be replaced with the same tissue only. The same law applies to all the organic elements. Ballance tells us that even the most aseptic catgut wound around an artery is a foreign substance, which the phagocytes attack and assimilate as a heterogenous element. All of which points, as this eminent author avows, to the fact that the ligation of arteries is yet in a very unsatisfactory state.

In the near past, when "laudable suppuration" was regarded as an important phenomenon in all flesh wounds, the presence of extraneous materials was not regarded as harmful. But since the elimination of suppuration, absolute and complete, is demanded as the *sine qua non* of sound surgery in all uncontaminated wounds in our time, the methods of the past will not do for the present; and in order to have our therapy in accord and harmony with modern biologic studies and pathologic doctrines further advances must be made.

When the thought dawned on me that the homologous ligation of the arteries was a practicable expedient it was soon apparent that it would only apply to certain definite phases of hæmorrhage only. This I was quite certain of, though it occurred to me that in many instances, when the vital elements of the arterial walls were too scant to be used in this way, the heterogenous tissues in the immediate vicinity might be drawn on for a similar purpose. Yet there remained many situations in which obturation might be impracticable. In the vast majority of these cases by the appropriate utilization of torsion we can efficiently obturate the vessel.

Homologous ligation promises the most happy results in the larger arteries as the femoral, brachial, carotid, and the larger arteries of the forearm and leg. It seemed to me a simple and practicable expedient in closing the arteries of the spermatic cord, as the cremasteric and spermatic are long, thread-like vessels which could be firmly knotted when desired close to the gland.

This expedient seemed to me specially adapted to those cases of primary amputation in which the limb is immediately and permanently destroyed beyond every hope, yet in which many of the vessels and nerves preserve their vitality varying distances beyond the point at which an amputation must be made.

In the smaller arteries, when sufficient of the caliber of the vessel can be exposed without doing violence to adjacent parts, it might serve a most useful purpose.

That homologous ligation in continuity has a place is yet to be determined. If, however, the principle on which it rests is a rational one, then there can be no question but it may be utilized in this class with advantage.

TECHNIQUE OF HOMOLOGOUS LIGATION.

This may be divided into three stages. (1) The isolation of the vessel. (2) Its bisection and ligation. (3) Vascular fixation and approximation of the tissues.

Isolation of the vessel.—In the mangling of tissues, which we so generally find in very serious compound fractures, and when the trunk of the vessel to be treated lies free and close to the surface under the torn integument and other tissues, it may be easily detached from it loose connections, raised from its bed, and drawn out sufficiently far for homologous ligation without difficulty. But when the artery is torn in two the question may arise as to whether if the distal, divided end preserve vitality it may not in this manner be utilized for ligating the proximal end.

Assuming, however, that we propose dealing only with the proximal end and that we propose to utliize it for its own occlusion, many difficulties may present themselves. If the brachial artery, as an instance, is torn through at the inferior end of the insertion of the pectoralis-major, close to where the internal and external cords of the brachial plexus form a Y, and the main trunk passes immediately into and under its apex, the isolation of it without damage to the nerves or sacrifice of many of the numerous axillary branches may seem quite impossible.

In an amputation we may have little consideration for these contingencies, hence if a large nerve trunk lies in the way we divide, lift the vessel up through the gap, replace the nerve ends, pass a fine catgut suture through the neurillemma, and replace it.

If the section of the main trunk is convenient to a large branch, in amputation cases, this may be caught between two forceps and divided.

At least 2 inches of the extent of the vessel must be liberated and exposed, with its sheath intact if possible, when gradual but steady tension is made on the vessel in the direction of the long axis of the trunk until it is fully stretched, at which time another clamp-forceps is firmly fixed as close to its point of emergence from the tissues as possible. This completes the first stage of the operation.

Bisection and ligation.—It will be noticed that thus far our operation varies but slightly from that of torsion, which, indeed, this is a species of. Its contrasting features consist only in that instead of twisting the vessel on itself we utilize its walls for a knot.

The clamp on the free end of the vessel is now removed, and we will deal with the vessel according to its caliber in two different ways. If it be a small vessel it is tightly knotted on itself in two or three places. When each knot is drawn tension is maintained until the elasticity of the vessel is overcome. Now that the knotting is completed the vessel is liberated.

With a large trunk a somewhat different technique must be observed; the initial steps, however, are similar to those employed in more diminutive vessels. Here the vessel is bisected or trisected.

While I have succeeded by merely dividing the vessel and tying the ends (fig. 1), later experiments have assured me that to split the vessel in three segments, employing one to turn on itself and plug the open lumen of the vessel and then ligating with the other, a more effective obturation is secured than on using but two strands. In all these cases of section of the vessel the division was carried up to within about two lines of the point at which the uppermost margin of the artery appeared through the tissues. Now, the free ends are again moderately stretched, when they are tied with a reef-knot, singly, doubly, or trebly. The knotting being completed, the free ends are firmly drawn on and tension continued from two to four minutes, when the upper forceps is removed and the vessel is released.

The third and final stage embraces vascular fixation and approximation of the tissues.

With the larger vessels, with this procedure, an adjustment ligature of strong catgut, carried well into the tissues and firmly knotted, serves a most valuable auxiliary purpose. The integumental suture will serve this purpose in the majority of cases; but if an accessory suture or two are regarded as necessary, we should not hesitate to insert them.

It goes without saying, that in every instance the possible success of homologous ligature of the arteries depends on an aseptic wound.

Every description of straining and bodily movement should be prevented as far as possible for the first forty-eight hours after operation. Vomiting, coughing, or straining at stool all greatly increase arterial tension, and should be avoided as much as possible until the immediate danger of secondary hæmorrhage is past.

CONCLUSIONS.

Whether homologous ligation or obturation of arteries, the former by a living tissue and latter by torsion of the vessel, possess enduring value, experimental work and clinical observation alone will decide. Torsion is a very ancient expedient, which suffices for the control of diminutive and superficial vessels, but for those very deeply lodged or those of very large caliber it has not been very generally trusted until recent times; since the attention of the profession has been called to the subject by Prof. John B. Murdock, who has revived it on a large scale and has shown that with the perfected technique of modern dressings and the elimination of suppuration from fresh wounds, its application has a very large field.

As for homologous ligation, I am firmly convinced that with the onward march of progress in the near future the question of perfected hæmostasis will be definitely settled, and that on this line of investigation its solution will in the main rest. Time and opportunity permitting, it will be my aim to continue my experimental work and test to the fullest this species of automatic constriction on the human subject, and report final results later.

EXPERIMENT ON THE ARTERIES OF THE DOG.—TORSION, THE TRANSFIXION LIGATURE AND HOMOLOGOUS LIGATION.

June 15, 1893: Middle-sized terrier-poodle; animal anæsthetized with ether; right femoral artery exposed in Scarpa's triangle for about half an inch of its extent. Its sheath was now divided, the wall of the vessel lifted out, when it was caught and the entire caliber of the trunk compressed by two coarsely toothed, strong, clamp forceps. These were allowed to remain on ten minutes, when they were removed. Immediately the lumen of the vessel refilled, and the pulsations were as vigorous as ever beyond the point of compression.

Now the two forceps were again applied over their previous site, when the vessel was divided with the scissors completely through, after which the distal forceps was seized and slight but steady traction made for a moment, when it was made to twist the open end of the vessel until that extent of torsion was reached that it could be carried no further without effecting the complete detachment of that part of the vessel engaged. Both forceps at this stage were removed.

The free orifice of the vessel had been completely occluded. It freely pulsated with each systole of the heart, but hæmostasis had been complete. After the divided parts had been duly prepared they were approximated and covered with dressings.

Accidental division of the left femoral artery—Prompt and effective hæmostasis by the temporary transfixion ligature.

It was intended to repeat the same experiment on the left femoral at the same time on the same animal.

Not being aided by ample assistants and finding that the vessel on this side pursued a rather abnormal course, the artery was accidentally wounded and immediately gave issue to large jets of blood.

As it had been completely cut in two, both ends were quickly retracted out of sight in the soft parts.

In this emergency, as ample facilities were not at hand to search for and secure the spouting proximal end, the trunk was compressed over the *pubes*, when a silk ligature with a sharply curved needle was passed under the proximal segment of the vessel about half an inch posterior to the orifice. This ligature included the loose connective tissue, the sheath, the *vasa vasorum*, the artery, and other structures. After being tied, one free-end was left out. Thus the transfixion ligature effectually succeeded in closing the lumen of the vessel and subduing all hæmorrhage. The incised parts were closed in by one row of continued suture, when dressings were applied.

The dog came out of ether well and was returned to his crib.

June 30: The wounds over the inner side of the thighs were now nearly healed. It was now intended to extend our investigations into the carotid triangles; try torsion on one vessel, and homologous ligation of the artery on the other side.

The animal was placed under ether and the sheath of the vessel exposed on the right side, when it was noticed that he ceased to breathe. In a moment he was dead.

Now a very careful examination was made over the site of the incisions which exposed the femoral vessels two weeks previously. The right side was the first dealt with. Here it was found that all the tissues had cicatrized into one homogeneous mass.

Tearing open the cicatrix, no trace of the artery could be found until about two centimeters of the scar tissue were stripped in the direction of the long axis of the limb in an upward direction; at which point the obturated, cord-like proximal end of the artery was discovered. Though the artery was so intimately incorporated with the cicatrix in which it was embedded as to be only separated with difficulty, by tracing it up a few lines we came on the healthy artery which was empty except for a line above the point of obliteration at which point a decolorized, conical blood clot was found. The embolus was, even at this early stage, so blanched, consolidated, and organized as to closely resemble connective tissue.

The distal end was not so deeply incorporated as the proximal. Its orifice was obliterated, not by an embolus, but by an adhesion of its walls, from an exudative endarteritis.

Dissection of the left femoral artery.

On the left side the temporary transfixion ligature was employed. Although the purpose of this ligature is to only serve a momentary end, in this case it was allowed to remain on for two days, after which time it was cut away, no hæmorrhage following.

In this dissection, as in the former, it was seen that the injured artery was caught and entangled in a mass of new tissue.

As with the vessel on the right side, the proximal end was firmly occluded by an organized, firmly adherent embolus.

It may be added that in both of these extremities, in which simultaneously the femoral torrent was abruptly cut off, they remained well nourished, and on post-mortem examination there were no evidences of atrophy.

EXPERIMENTS ON SECOND ANIMAL.

July 6, 1893: 1. Homologus ligation of the proximal end of the right carotid artery in the superior carotid triangle; closure of the distal end by torsion.

2. Homologous ligation of the right femoral artery in Scarpa's triangle. As the knot slipped after the proximal end retracted the hæmorrhage was controlled by the "temporary transfixion ligature." The distal end of the artery was closed by torsion.

July 17: Same animal, a bull terrier, examined; all the ligatures held. There was a moderate sized exudation into the subcutaneous tissues at the point where the carotid was divided. Neither of the wounds healed by primary union. Again anæsthetized and homologous ligation of the left femoral artery undertaken.

Here, on division of the tissues, such an anomalous state of things was discovered as to render this species of arterial obturation rather impractical. The vessel bifurcated in Scarpa's-triangle, with a larger branch so wound around the femoral vein as to render its isolation very difficult. The vein itself was lacerated and gave issue to a large effusion of blood before it could be controlled. In this case, as the artery itself was wounded, on manipulation it was found necessary to apply a ligature directly over its proximal and distal ends. Our experiment on this occasion was an entire failure.

It was noticed so far in our experiments that the collateral branches of the arteries in the dog are large and numerous, and hence the suppressed circulation is very promptly reëstablished. This is apparent by the energy of the recurrent torrent from the distal end of the vessel after division.

A singular peculiarity was noticed with the veins of the dog. Their walls are proportionally very much thicker than with man, and the energetic circulation through them demands well-directed pressure to arrest it.

MISCELLANEOUS—APPLICATION OF THE PRINCIPLE OF HOMOLOGOUS OBTURATION OF THE LUMINA OF CAVITIES AND SPACES.

Since this line of study and experimentation has occupied my attention it occurred to me that if homologous obturation of the arteries is feasible and practicable, then the field for the general utilization of the "living ligature," or suture, was indeed a large one.

On the 20th of July, this summer, a captain in the fire department of this city came into my hospital service with a strangulated hernia. On decortication of the sack under cocainization, with a redundant flap of fibro-serous tissue in my hand, the thought occurred to me, why not utilize this tissue to obturate the inguinal canal?

Authors speak of stretching, twisting, furling, ligating, and excising the sac in hernial operations, but none that I am familiar with have yet recommended utilizing it as a knot for tying its own end. In this instance I split the sac in the direction of the long axis, carrying the incision as far upward as the internal ring. I then seized two loops and tied them in a triple reef knot. After the knot was fixed it was pressed inward within the internal ring. Then the other two loops were so adjusted as to overlap the first knot. This was secured in a double reef knot, a catgut suture was carried on a needle directly through the sac and the edges of the pillars on either side then firmly tied. The incision was closed without drainage. Healing was prompt, constitutional symptoms *nil*, and the patient left the hospital soundly healed in just two weeks.

Two weeks ago I resected a large plexus of varicose veins on the inner aspect of the leg and thigh of a young woman. I found that the homologous ligation of either end of the vessels served an admirable purpose as a ready and effective means of obturation. The vessels were greatly dilated and quite valveless, so that the proximal divided end of the saphenous required firm pressure to stop the recurrent flow; but the "living" suture was equal to the occasion. Cases might be multiplied in which this expedient serves an ideal purpose. When there is a sparcity of homologous tissue, there is no reason why we should not reach out and utilize or borrow from a neighboring structure, as from the muscle sheaths, aponeuroses, the neurilemma of nerves no longer needed, tendon, integument, etc.

Without doubt other investigators and operators will so perfect and extend the employment of this principle that in the near future the technique will be so simplified and effective that no sort of extraneous ligature or suture material will be required for any but very exceptional cases. Man undoubtedly carries within himself all the necessary materials for the mechanical repair of the many traumatic lesions to which he is liable.

Time has proven that all chemical solutions are foreign substances, and that they have no place in healthy wounds; that the ideal is asepsis, sterilization, and non-irritant liquids; that overdraining and excessive flushing are both needless and harmful.

May not the time be near when the question of the ligation of arteries and approximation of tissues by foreign materials will be solved by discarding, generally, all except such as are provided by the living economy?

The successful utilization of the autogenous ligature, or suture, depends chiefly on rigorous asepsis. It has no place in a foul, infected wound. Those operations in which it is employed are necessarily rendered more tedious, as effective technique entails very delicate manipulation. In all cases of homologous ligation of the blood vessels we should be assured that all hemorrhage is subdued before the wound is finally sealed. The part must be kept extremely quiescent for the first twenty-four hours. After that, with ordinary care, everything will go on well and as a rule not more than one dressing is necessary until union is complete.

THE TORSION OF ARTERIES FOR THE ARREST OF HÆMORRHAGE.

By Dr. J. B. MURDOCH, of Pittsburg, Pa.

To the members of the National Association of Railway Surgeons who were present at the meeting held at St. Louis in May, 1880, this paper will contain little that is new. The interest taken in the subject at that time was so great and the discussion which it elicited so animated that I am encouraged to bring it before this larger audience of the Pan-American Medical Congress. The subject is, in my opinion, so important that every surgeon should be familiar with it. Since the reading of the paper referred to I have continued to practice and to teach this method of controlling the hæmorrhage from wounded arteries and veins, and increased experience only confirms me in the value of this method as a hæmostatic. What I shall now say is only a reiteration of what I have already said, with the addition of a later and larger experience.

There is no subject of greater interest to the practical surgeon than the arrest of hæmorrhage. This remark is equally true, whether the hæmorrhage comes from a wound accidentally inflicted or made intentionally by the surgeon's knife. Without the means of stopping the flow of blood from bleeding vessels the surgeon's art would be greatly crippled, and surgical operations where blood-vessels must be divided would be impossible. There is no sight so appalling as a formidable hæmorrhage. When a large artery is opened the blood gushes out in an angry stream, the face becomes pale, the color leaves the lips, the respiration becomes sighing, the heart fails to beat, and death soon closes the scene. Surgeons from the earliest ages have shared with the people this dread of hæmorrhage and have ever been striving for the best means for its control. Upon no subject has our profession been more conservative than upon this one, the arrest of arterial hæmorrhage.

Since the time of Celsus, notwithstanding the numerous methods which have been proposed for this purpose, but two, viz, the actual cautery and the ligature, have received the endorsement of the profession. But if the profession has been slow to endorse new methods, its confidence once gained has been most unwillingly surrendered. From the time of Archigenes, who practiced in Rome shortly after the time of Celsus, up to the time of Richard Wiseman, sergeant-surgeon to King Charles II, the red-hot iron was the sole method employed. Thus this method of checking hæmorrhage after amputation not two centuries ago was the same as that used for fifteen hundred years previous. The pertinacity with which surgeons adhered to the use of the actual cautery after Paré's great discovery of the ligature well illus-

trates the fear in which surgeons stood of hæmorrhage. They had used and had seen their fathers use the red-hot iron, and, notwithstanding the pain it caused and the interference with primary union, they were unwilling to discard the agent which long usage had taught them was successful.

In 1564 Ambrose Paré published his new discovery, which, to use his own language, "was taught him by the special favor of the sacred Deity." In this publication, as is well known, Paré demonstrated the value of the ligature as a hæmostatic. But owing to the extreme fear of hæmorrhage and the criminal neglect of surgeons it was two hundred years before it was adopted by the profession, and then it came into favor through the influence of Sharpe, one of the surgeons of Guy's Hospital, London, who boldly championed the claims of the ligature to popular confidence. Since this time nothing has dislodged the position which the ligature has held as a hæmostatic in the opinion of the profession.

The efforts made by Sir James Y. Simpson, of Edinburgh, to substitute acupressure, and the still more recent endeavor of Dr. S. F. Spier, of Brooklyn, to substitute constriction for ligation have most signally failed. The same statement may also be made in regard to torsion as a means of arresting arterial hæmorrhage. It has not received the support of the profession to any great extent, but, unlike the other rivals of the ligature, it has had champions for hundreds of years, and still holds a place as a valuable means of arresting hæmorrhage. The subject has received but little attention from modern surgeons. The twisting of an artery to arrest bleeding is of ancient origin. It is spoken of by Celsus. A fact often observed, that an arm or leg may be torn from the body with the loss of only a few drops of blood, no doubt suggested the method. It has been advocated by such surgeons as Amussat, Dieffenbach, Schroeder, and Syme. But the credit of bringing it prominently before the profession and establishing its efficiency is due to Mr. Bryant, the late distinguished surgeon of Guy's Hospital, London. At this hospital the ligature is seldom used, torsion being chiefly relied upon. Mr. Bryant tells us, in the last edition of his Surgery, that in two hundred consecutive amputations of the thigh, leg, arm, and forearm all the arteries were twisted, one hundred and ten of them being the femoral artery, and that in no case was there secondary hæmorrhage.

Mr. Bryant says:

"The physiological arguments in favor of torsion are very great and the practical advantages seem to be no less. After seven years' experience in its practice applied to vessels of all sizes, the femoral being the largest, I have had no mishap. I have observed that wounds have united more rapidly, kindly, primary union being the rule. There has been less constitutional disturbance after operation, and consequently less liability to traumatic fever, pyæmia, and other complications, such as we are all too familiar with in the practice of surgery. I have had stumps heal in a week and the patient up in two weeks without one single drawback, rapid and uninterrupted convalescence following the operation."

Having given this experience of Mr. Bryant, I desire now to give my own, as observed at the Western Pennsylvania Hospital, of Pittsburg. At this hospital torsion is almost exclusively relied upon to check the hæmorrhage from wounded arteries or veins, whether the wound be produced by the surgeon's knife or otherwise. My experience with torsion as a hæmostatic dates back to the year 1872 when I became a member of the hospital staff. My colleagues had, previous to my connection with the hospital, been twisting arteries as large as the radial and ulnar. The facility with which this was done, and the fact that the wounds healed kindly and without secondary hæmorrhage, induced me to follow their example, at first timidly; but with success came confidence. Having been successful in the amputation of a forearm with no untoward result, I ventured next to twist the brachial after the amputation of an arm; soon after this, the axillary, then the popliteal, and finally the femoral. And now for the past twenty years torsion for the arrest of hæmorrhage after all surgical operations, has been the recognized and almost the only method employed. It is to be regretted that records have not been kept of the number of large arteries which have been twisted to arrest the hæmorrhage.

The following is a table showing the number of arteries divided in cases of amputation where torsion has been resorted to for the arrest of hæmorrhage at the Western Pennsylvania Hospital, Pittsburg:

	Times.		Times.
Femoral	160	Posterior tibial	405
Popliteal	24	Brachial	115
Axillary	24	Radial	59
Anterior tibial	405	Ulnar	59

There are two methods by which the torsion may be applied, as is illustrated by the following two cuts.

(1) Limited torsion and (2) free torsion. In the first method two pair of forceps are required. The first pair grasps the vessel at its cut extremity and pulls it from the sheath. It is then seized by the second pair at a point from one-half an inch to an inch above the cut extremity of the artery, this second pair being held at right angles to the long axis of the vessel. The first pair is then given three or four sharp turns.

By the second method (free torison) only one pair of forceps is required. It is the one recommended by Mr. Bryant as not being so likely to injure the external coat of the artery. And this is the method which was adopted in the cases which I have given. A good pair of forceps is required which will hold the end of the artery firmly, that has no lateral motion, and with serrations blunt enough to obviate any laceration or cutting of the parts seized by the blades. The vessel should then be drawn out as in the application of the ligature, and three or four sharp rotations of the forceps made. In large arteries, such as the femoral, the rotation should be repeated till the sense of resistance has ceased. The ends should not be twisted off. In small arteries the number of rotations is of no importance and their ends may be twisted off or not as may be preferred. In all of the cases mentioned in the above table free torsion of the arteries and veins was the method resorted to to control hæmmorhage.

In addition to these cases, of which we have a record, torsion has been the method resorted to in all other surgical operations performed during this period, such as amputations of the female breast, the removal of tumors, the excision of joints, etc. It is within bounds to say that torsion has been resorted to at this hospital in thousands of cases without any mishap. We have had no case of secondary hæmorrhage which could fairly be attributed to the method of controlling the hæmorrage, not only at the Western Pennsylvania Hospital, but in all of the hospitals in Pittsburg and the surrounding towns. Torsion is the method most frequently resorted to for the arrest of hæmorrhage.

Our surgeons, as a rule, have more confidence in it than in the ligature.

The following letter from Dr. J. J. Buchanan, the accomplished surgeon at Mercy Hospital, the second largest hospital in Pittsburg, bears out the truth of this statement:

AUGUST 30, 1893.

DEAR DOCTOR MURDOCH: In reply to your query concerning my experience with torsion as a means of controlling hæmorrhage, permit me to say that I have used it constantly, though not exclusively, for twelve years for arteries of all sizes up to and including the femoral and have never known a hæmorrhage to follow its employment. My colleague, Dr. R. W. Stewart, and myself make frequent use of it in the surgical service of Mercy Hospital, both for arteries and the larger veins, and feel no anxiety concerning hæmorrhage in our cases.

Yours, very truly,

J. J. BUCHANAN.

So also, listen to what Dr. W. T. Huston, of the Altoona General Hospital, says:

We find that torsion is just as safe as ligation and gives nature a better chance for repair, for she has no foreign body to contend with as in ligation. At this hospital I can safely say that there has not been one-half dozen ligatures in amputations

during the last eighteen months and we are having excellent results from the torsion of vessels. During the above-mentioned time there have been over fifty major amputations performed in which torsion was used for the control of hæmorrhage. In all of these cases the patients never lost any blood from twisted arteries—not even from the femoral artery. We can, therefore, safely recommend torsion as an excellent means of controlling hæmorrhage; and now we resort to torsion altogether, as it has given the most gratifying results in the control of hæmorrhage.

Commendations like the above could be secured from every hospital in western Pennsylvania.

The advantages of torsion as compared with ligation are:

(1) The greater facility with which it can be applied. I am fully aware that this proposition is disputed; but to those who are familiar with both methods there can be no doubt that torsion is the easier of the two. For the ligation of an artery an assistant is required to seize the vessel and draw it out while the ligature is applied. For torsion the surgeon requires no assistant. The vessel must be seized by the forceps in either case. In torsion it only requires three or four turns of the forceps to complete the process, which can be accomplished in as many seconds. When a ligature is applied, let the operator be ever so skillful, the thread may break or slip off the vessel; but if neither of these accidents occur, the process can not be accomplished in anything like the same time.

(2) Torsion is a safer method, being less liable to be followed by secondary hæmorrhage. This proposition has been absolutely proven by the experience in the use of torsion at Guy's Hospital, London, and I have now given additional proof by the experience given in this paper.

(3) Healing is facilitated because the wound is free from any irritating or foreign body. This proposition is so plain that it should not require an argument. It was true before the antiseptic treatment of wounds had come into such general use, but is doubly so now. The catgut ligature is, no doubt, a safer ligature than the silk, for it does not require an ulcerative process for its discharge, and when this ligature has been made thoroughly antiseptic it is no doubt the best. But a ligature rendered thoroughly antiseptic is not always at hand and those surgeons who have had most experience with the antiseptic treatment of wounds will, I think, be the first to admit that, in spite of their most careful attention, septic germs are often introduced into the wounds by means of the ligature. Even after every precaution in preparation and preservation, the handling of a ligature in its application is a frequent source of infection. But there are other objections to its use. The catgut ligature may dissolve before the artery has become closed by the natural hæmostatic process, or it may unbind. Both of these accidents have been the frequent cause of secondary hæmorrhage. Being a frequent visitor at the principal metropolitan hospitals, both in this country and in Europe, I am familiar with the practice of our most skillful surgeons. It is exceedingly annoying for me to witness a thread break or slip off an artery, which often happens in the effort to tie it, when I know that the vessel could be so easily twisted while it was in the grasp of the forceps. When I have asked many of our distinguished surgeons why they do not resort to torsion, the reply is always the same: "We are afraid to trust it." This answer might have been given with equal force by Richard Wiseman in the seventeenth century had he been asked why he did not resort to the ligature instead of the hot iron.

In a matter so important as the arrest of arterial hæmorrhage it is proper that surgeons should be conservative, but there is such a thing as pushing conservatism too far. In the torsion of arteries I claim we have an improvement upon ligation; its claims for recognition rest upon physiological arguments which can not be shaken, and its reliability as a hæmostatic has been proven by abundant experience.

URÆMIC COMA FOLLOWING A MINOR INJURY, WITH SPECIAL REFERENCE TO ITS MEDICO-LEGAL ASPECT.

By Dr. FRANCIS FINNEY, of La Junta, Colorado.

So far as I have been able to gather from a somewhat extended research, the medico-legal aspect of uræmic coma, due to latent renal disease; and following close on the heels of injuries more or less severe, has not been very thoroughly investigated. That uræmic coma does occur after, and in fact is precipitated by, such injuries, has recently been brought very forcibly to my notice in a case which came under my care in the Atchison, Topeka and Santa Fe Railway Hospital, at La Junta, Colo., and which is at the present time the subject of litigation in a suit for damages against the surgeon who attended the patient at the time of injury and gave his order for admission to hospital. The case in point is one which so well illustrates the false and dangerous position in which any one of us may be placed, especially in the care of injured railroad employés, that I have thought it would not be uninteresting to the railroad surgeons at this meeting to report it in full, with a brief reference to its medico-legal aspect. Before proceeding to a report of the case in detail, I will briefly call attention to a few points in the clinical history, diagnosis and prognosis, of the diseases which produce this "symptom-complex" called uræmia. This condition is produced whenever there are disturbances in the excretion through the urine of urea-producing substance in the blood and occurs most frequently in diseases of the kidneys; also, when there is a mechanical interference with the discharge of urine through the urinary passages; the latter cause does not in this connection interest us.

Uræmic symptoms are most frequent in the different forms of Bright's disease, viz, most common in chronic interstitial nephritis, less so in acute nephritis, and still less common in chronic parenchymatous nephritis. In the acute diffuse nephritis following scarlatina and other acute diseases it is a common symptom. It is not as common in waxy degeneration, but not infrequently occurs.

Symptoms.—A few of the prominent symptoms will suffice for the purposes of this paper. They are in some cases very sudden, and prove rapidly fatal. Nervous symptoms are frequent, such as headache, dizziness, etc.; spasmodic muscular contractions are also common, either single muscles, groups of muscles, or general muscular contractions, and these contractions often precede other manifestations. Disturbances of consciousness are extremely common and often form the initial symptom. The patient grows apathetic, then somnolence develops and proceeds to profound coma, sometimes with and again without convulsions. Sight and hearing are often affected; vomiting, epistaxis, or salivation may occur; pupils are generally slightly dilated, they may be normal. The pulse during an attack is rapid, small, and irregular, and corresponds to the impaired vigor of the heart's action.

Diagnosis.—In some cases the onset is so sudden and unexpected that a diagnosis may be extremely difficult. The condition may be mistaken for meningitis, epilepsy, cerebral hæmorrhage, tetanus, trismus, delirium tremens, mania, or narcotic poison. The last named is of special importance in this case.

Prognosis.—The prognosis is always grave. Briefly, the history of the case referred to is as follows:

January 6, 1892: 8:30 A. M.: W. H. P——, age 29, widower, brakeman on Atchison, Topeka and Santa Fe Railway, had his left leg severely lacerated by being caught between the engine and drawbar of a car. The laceration was pushed together and bandaged with strips of a clean sheet by his fellow-workmen, and he was taken to the nearest surgeon's office, where he arrived about 9:45 or 10 o'clock A. M. The surgeon met him on arrival of train, and had him removed on a stretcher to his home, about one block from track. As the man was suffering considerable pain and shock, the surgeon, on his arrival at home, gave him a hypodermic injection of $\frac{1}{4}$ grain morphia sulph. and directed that some useless articles be removed from the room; towels and hot water be prepared while he went to his office for some additional articles for a complete dressing. Returning from his office between

10 and 11 A. M., he found the patient comfortable and cheerful, and expressing a desire to be sent to the hospital at La Junta in the evening, if possible, giving as a reason that he had been under treatment for syphilis for about a year and desired to keep up the treatment without the knowledge of his mother.

The leg was then dressed (under irrigation of bichloride solution 1–3000) in a thoroughly antiseptic manner. The surgeon cut away some ragged tissue, but did not bring the edges of the wound together with sutures, as he had some doubts as to the integrity of some of the muscular tissue left. The leg was washed and shaved and after dusting with iodoform, was dressed with seven or eight layers of bichloride gauze, gutta-percha tissue, absorbent cotton, and bandage. The patient was left with the understanding that he would be taken to train at 4 P. M. and sent to hospital. The surgeon was called about 3 P. M. and found the patient in almost a condition of collapse. He was cold, pale, with a weak, rapid, and irregular pulse; respiration slow and irregular, occasionally but not uniformly sterterous; pupils were dilated. (The surgeon noticed this particularly because the patient's mother and other women present were talking of morphine poison.) He could be made to swallow, and was given stimulants by the mouth. The surgeon gave 1/50 grain digitalin and several doses of whiskey by hypodermic syringe, and had heat applied externally. The man slowly recovered consciousness and his respiration, and circulation became about normal. He was so far recovered that it was considered perfectly safe to send him to hospital on the 9 P. M. train that evening. He was accordingly put on stretcher and placed in the baggage car on train No. 6, and brought to La Junta, a distance of 63 miles, being accompanied on the journey by a friend. The surgeon saw him safely off on the train, and sent by him a note to me in which he recounted the condition in which the patient had been that afternoon and attributed it to delayed shock; also stated that he had not sutured the wound.

Patient arrived at La Junta about 11 P. M. and was transferred by ambulance to hospital. I saw him safely to bed and left him in good condition, with the exception of pallor and a rather weak pulse. He had no medicine during the night, and rested fairly well.

January 7: 8 A. M.: Patient took light breakfast, sitting against a rest in bed; expressed himself to me as comfortable; 8:30 A. M. I dressed the leg, under bichloride irrigation and found it dressed in a thoroughly antiseptic manner. It was a lacerated wound of the left leg about 10 inches long extending from the right of crest of the tibia around and down to the back and lower part of the calf. The bones were not injured. I cut away some ragged and contused muscular tissue, and after a thorough irrigation closed the wound with catgut sutures, with the exception of a small space at lower angle, where I inserted a drainage tube, and dressed the wound antiseptically.

Record for the 7th instant: Pulse, A. M., 80; temperature, A. M., 99°; pulse, P. M., 80; temperature, P. M., 99.2°. Ate three moderate meals. Intellect perfectly clear; called my attention to the fact that he had syphilis and expressed a fear that it would retard his recovery.

January 8: 8 A. M. Patient rested fairly well; pulse 84; temperature 99.2°; was wakeful and restless, but did not complain of pain except headache. Had no medicine since admission; intellect somewhat dull. Ate a light breakfast, sitting up in bed. Nurse reported that he had passed no urine since noon of the 7th. I questioned him about it, and he said he had no desire to urinate. On palpation, bladder was found nearly empty, so I thought best to leave him alone a few hours before using catheter. At 10:30 a. m. the nurse reported to me that the patient had become very stupid. I went to him and found him in a semi-comatose condition, with a weak and irregular pulse, partially sterterous breathing, pupils dilated slightly. He could be roused by shaking, but would immediately relapse into somnolence. He had not yet passed urine, so I catheterized him and found 6 ounces of urine in the bladder. It occurred to me that the condition was one of uræmia. On examination the urine was found to be loaded with albumen, about one-third of the bulk of specimen after

standing two hours in a test tube. Despite appropriate and continuous treatment, the patient drifted into a deeper and deeper coma, with no general convulsions, but considerable muscular twitchings, and died at 4:30 P. M., January 8, 56 hours after injury and 52 hours after the last and only dose of morphine was administered. No autopsy was permitted.

Almost a year after this patient died the surgeon who gave the primary treatment and dressing was served with a notice of a suit for $5,000 damages sustained by the heirs of deceased, consisting of two minor children. The main points in the case of the plaintiff as brought out on trial and attempted to be proven were; first, the wound sustained was not in and of itself sufficient to cause death; second, the dressing of the wound was not properly and promptly done and; third, the patient was killed by morphine administered by the surgeon. The defense admitted that the wound was not in and of itself sufficient to cause death, but claimed that it acted as an exciting cause and precipitated an attack of uræmia in the patient, who was admittedly syphilitic and who, in all probability, had a latent disease of the kidneys.

The first trial of this suit resulted in a failure to agree on the part of the jury and a second trial is now pending. The trial of a case of this kind before an ordinary jury is a farce. The case abounds in suggestions but to follow them all would make a very long paper.

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THE NOSE AND THROAT SERVICE OF THE MISSOURI PACIFIC HOSPITAL FOR 1892.

By HANAU W. LOEB, M. D., St. Louis, Mo.

The railway hospital service, though but recently instituted, has so grown in importance and influence that the writer feels justified in presenting his own work in a single department of what is, in all probability, the best railway hospital service in the world.

That there is good cause for special treatment of the nose and throat among railroad employés is manifest, for those whose every-day life and work bring them into an atmosphere ladened with dust, smoke, and cinders are more often affected with nasal and pharangeal trouble than any other class. Dust and smoke are irritating to the delicate mucous membrane and although a perfectly healthy nose may withstand the influence of this dust, the slightest abnormality in any part of the nose or throat will be heightened by this pernicious environment. Railroad men are, therefore, to be protected from that morbidity which their daily life encourages.

During the year 1892 there were treated by the writer in this department 241 patients, of whom 18 were under 20 years of age, 131 from 20 to 30, 71 from 30 to 40, 14 from 40 to 50, and 10 over 50.

It is thus seen that more than half of the patients were between 20 and 30 years of age, as one would quite readily imagine.

Twenty-four different towns and cities were represented in this number, as follows: Allenton, 1; Argenta, 3; Atchison, 1; Benton, 1; Bismarck, 1; Clifton Heights, 2; Columbus, 2; De Soto, 15; East St. Louis, 2; Ellendale, 2; Henson, 1; Kirkwood,

4; Laclede Junction, 1; Little Rock, 9; Memphis, 4; Pacific, 3; Piedmont, 1; Poplar Bluff, 6; St. Louis, 168; Sedalia, 10; Shrewsbury Park, 2; Van Buren, 3; Waggoner, 1; and Wynne, 1.

St. Louis naturally contributed the majority of the cases. Patients west of Sedalia are referred to the Kansas City hospital, and therefore do not come under the writer's clientele.

In nationality the American leads with 173, followed by the German, 30; Irish, 19; Canadian, 8; English, 5; French, 4; Danish, 1; Portuguese, 1; Scotch, 1; Swedish, 1; Swiss, 1. One hundred and eight were married, 132 single, and 4 widowed.

The greatest variety of occupations is exhibited; in fact, few of the positions held in a railroad company failed to have representation. They are as follows: Accountant, 1; agents, 2; assistant claim agent, 1; assistant general foreman, 1; assistant yard master, 1; attendant, 1; baggageman, 1; blacksmiths, 3; boiler-makers, 3; bookkeeper, 1; brakemen, 17; brass-finisher, 1; cabinet-maker, 1; car cleaners, 2; car inspector, 1; carpenters, 5; car repairers, 3; chief clerks, 8; chief dispatcher, 1; clerks, 64; coal heaver, 1; conductors, 8; cook, 1; dispatcher, 1; engineers, 13; firemen, 7; foremen, 7; general auditor, 1; general yard masters, 2; helpers, 12; hostler, 1; laborers, 2; lamp trimmer, 1; machinists, 15; manager of telegraph, 1; nurse, 1; painters, 5; porter, 1; scale inspector, 1; seal tagger 1; section laborer, 1; stenographers, 9; superintendent, 1; superintendent of telegraph, 1; switchmen, 16; telegraphers, 8; watchmen, 9; watchmaker, 1; yard master, 1.

In January 47 patients were treated, in 161 visits; February, 57 patients, 206 visits; March, 78 patients, 322 visits; April, 56 patients, 221 visits; May, 56 patients, 158 visits; June, 41 patients, 124 visits; July, 30 patients, 76 visits; August, 40 patients, 136 visits; September, 43 patients, 169 visits; October, 49 patients, 176 visits; November, 35 patients, 133 visits, and December, 33 patients, 122 visits.

It is thus seen that the spring of the year contributed the majority of the patients, reaching the maximum in March, when 78 patients presented themselves for treatment, making 322 visits, or an average of 4.13 visits per patient. The minimum is found in July, when there were 30 patients, with 76 visits, making an average of 2.53 visits per patient.

During the summer and winter months the number of patients was considerably smaller than during the spring months, which is accounted for by reason of the unsettled nature of the weather in this latitude during the vernal months. It is well known that in the summer acute inflammations of the nose and throat are by no means so common as in the spring and winter months, and therefore patients are not apt to seek professional advice in these months. It is only when acute conditions occur that the patient feels the necessity of being treated for an inflammation or morbid condition that has lasted for many years.

Altogether the 244 patients made 1,998 visits, or an average of 8.2 visits per patient, making almost 5½ patients per day.

The number of diseases treated was 41, a statement which will doubtless astonish those who are accustomed to consider all diseases of the nose and throat as catarrh. In many cases several different diseases were present, but the predominant one here alone is given. They are as follows:

Adenoids	3	Rheumatism of the pharynx	1
Bronchial asthma	1	Sub-acute pharyngitis	1
Nasal asthma	5	Phthisis pulmonalis	4
Acute bronchitis	4	Nasal polypi	6
Chronic bronchitis	3	Relaxed palate	2
Deformity of the palate	1	Acute rhinitis	7
Chronic ethmoiditis	1	Chronic rhinitis	25
Falsetto of voice	3	Chronic atrophic rhinitis	18
Naso-pharyngeal fibroma	1	Chronic posterior hypertrophic rhinitis	2
Inflammation of the frontal sinus	2	Sub-acute rhinitis	1
Chronic laryngitis	6	Syphilis of the naso-pharynx	1
Subacute laryngitis	4	Syphilis of the nose	4
Lingual tonsil hypertrophy	3	Syphilis of the pharynx	1
Chronic naso-pharyngitis	20	Syphilis of the tongue	2
Sub-acute naso-pharyngitis	1	Acute tonsillitis	1
Foreign body in œsophagus	1	Acute follicular tonsillitis	3
Acute pharyngitis	9	Acute suppurative tonsillitis	3
Alcoholic pharyngitis	1	Chronic hypertrophic tonsilitis	8
Chronic pharyngitis	7	Elongated uvula	11
Chronic follicular pharyngitis	3	Mil	1

Very few cases of tuberculosis are referred to this department, the majority either being treated in the hospital proper or sent to some other climate, hence the number of cases of pulmonary tuberculosis is so small in the list just given.

OPERATIONS.

The tendency in the treatment of nose and throat diseases is in the direction of surgery, and this is well evidenced by the number of operations performed in this department, 133 in number.

The operations included the following:

Cauterization of inferior turbinated with chromic acid	1
Cauterization of inferior turbinated by electricity	12
Cauterization of middle turbinated by electricity	2
Cauterization of septum	1
Cauterization of tonsil by chromic acid	2
Cauterization of tonsil by electricity	15
Incision of the gum	1
Removal of adenoids by forceps and finger	17
Removal of nasol-pharyngeal fibroma	1
Removal of redundant mucous membrane by Loeb's snare	2
Removal of polypi by cold snare	1
Removal of polypi by galvano-cautery snare	2
Removal of polypi by Loeb's electro-cautery snare	12
Removal of septal spur by curette	15
Removal of septal spur by saw	31
Removal of septal spur by galvano-cautery	2
Removal of tonsil by the galvano-cautery snare	3
Removal of tonsil by Loeb's electro-cautery snare	3
Straightening septum fracture and reposition	2
Uvulotomy by galvano-cautery snare	3
Uvulotomy by Loeb's electro-cautery snare	5

It has been the writer's practice rather to remove the bony projection upon the septum and to straighten the septum than to cauterize the mucous membrane covering the turbinated bone, being of the opinion that the mucous membrane is more necessary to the proper function of the nose than the projecting spurs or ridges. It therefore appears that cauterization of the mucous membrane upon the turbinates was performed a far less number of times than one would naturally suppose from the great popularity of cauterization. Results, the writer is certain, have been better by the method adopted, namely, to remove small spurs and increase the space for the passageway of air without destroying any of the mucous membrane over the turbinates.

The electro-cautery snare devised by the writer was brought into requisition in many cases and its use has been continued in view of the excellent results in the cases upon which the instrument has thus far been used.

The lessons of last year's service have been various.

RAILROAD DUST.

The paper which the writer contributed a year ago upon the influence of railroad dust in the production and continuance of nasal and pharyngeal inflammations has been fortified by the work done during the year, and therefore the advice tendered in that paper to the effect that an oily spray of albolene with a proper remedial agent is of the utmost service, and should be prescribed whenever this condition exists. When the mucous membrane of the nose becomes covered with a layer of oil the dust particles, smoke, and the like can not adhere to it, and therefore their irritating effect is lost. A spray of this nature used by the patient morning and evening is an excellent prophylactic against acute inflammations, which so frequently follow the appearance of dust particles in the nose.

NASAL ASTHMA.

All five cases were improved by removing the obstructive lesions present. Two are still under observation, and it is confidently expected that they will escape hay fever this year. Up to the present date (August 25), in neither one of these cases has there been a manifestation of nasal asthma.

One case was manifestly due to the irritating effect of ashes and dust, the patient's work being in an ash pit, and a change of occupation entirely relieved him.

RHEUMATISM.

While only one case of rheumatism of the pharynx is presented in the list of diseases, rheumatism entered as a factor in a great many of the pharyngeal cases, and salol was therefore of incalculable benefit. The use of this agent can not be too highly recommended for those chronic pharyngeal inflammations which seem to owe their existence, in part at least, to a rheumatic diathesis or predisposition on the part of the patient, and even when there is no other evidence of rheumatism being present but a long-continued pharyngeal inflammation, the administration of salol is unquestionably indicated.

SYPHILIS.

Several of the cases, though quite typical, had been for some time unrecognized. In two cases almost half of the septum had been destroyed before the patients presented themselves for treatment.

All of the syphilitic cases were relieved, in fact cured of the special manifestation which was present. Iodide of sodium in large doses, varying from 15 grains to 180 grains three times a day, was administered, and nitrate of silver applied at various times to the ulcer wherever it was present. Dead bone was removed when present.

CHRONIC ATROPHIC RHINITIS.

In this disease it was found that menthol in 10-grain doses to an ounce of liquid albolene sprayed into the nose by the patient four or five times a day in conjunction with the daily removal of scabs and cleansing of the nose effected relief. Patients were compelled to present themselves every day so that the scabs and dried secretions could be removed. No water injections of sprays were permitted, no posterior or interior douching. Scabs were removed by forceps and by cotton on the end of a probe, a little cocaine first being used. In this way the nose was entirely cleansed and afterwards the spray being used would reach every portion of the disease of the mucous membrane. The patients improved most wonderfully under this plan of treatment, in fact better than under any other plan that had been used.

In conclusion, I feel that if railroad surgeons would consider the great benefit to be derived by providing proper nasal and pharyngeal treatment for their railroad employés there would be some one capable of treating this class of diseases in every railroad hospital in the country and if this matter is brought at all before them by this paper the writer will feel that a great good has been accomplished.

THE ESSENTIAL ELEMENTS OF IDEAL SURGERY.

By Dr. B. F. WILSON,

Surgeon Chicago and Alton Railroad, Slater, Mo.

In surgery the ideal is realized in any given case when the results show that conservatism and utility inspired the conception. To retain a part rendered useless by loss of counterparts or to save all tissue possible in every case would only serve to maim and burden the patient, a triumph of conservatism so ultra that instead of receiving plaudits it should be classed as malpractice.

The relative power of regeneration of the various tissues should receive thoughtful consideration by every operator in reaching his conclusions. The osseous tissues of the leg may be literally comminuted, yet if the vascular tissues be sufficiently intact amputation should be done only as a dernier resort. On the other hand, the soft and vascular parts of the leg may be so mutilated and torn, with little or no

injury to the bone, that amputation becomes not only conservative, but imperative. Railroad surgery, while comprising all that is common to general surgery, embraces much more, in the superadded elements of crushing force and violence embracing features distinctly peculiar to railroad traumatisms. Thus while the principles of general surgery must ever form the substrata on which to predicate a practice, yet a due recognition of the overwhelming destructiveness of railroad injuries must obtain and govern the operator else dire and disappointing results legitimately follow. Two injuries, alike in all essential respects as to parts involved and extent of injury, yield widely different results even if treated by the same surgeon. In one case the injury is local, the tissues as a whole are not involved, a bone is broken or an artery severed with little or no destruction of contiguous tissue, entailing upon the economy but a slight wave of nervous sympathy; whereas in the other, caused by a ponderous body impelled with great momentum, not only is the bone crushed and disintregated as virtually to constitute a vital amputation, the physical amputation being merely perfunctory.

The central idea, the one guiding thought to attain the ideal in railroad surgery, is ever to keep in mind the radical difference between railroad traumatisms and ordinary injuries; the cause of this difference in gravity, to wit, the crushing violence in railroad injuries that involve not only the physical integrity of the parts but also overwhelm the vitality in nervous shock and physical collapse. Experience teaches the railroad surgeon that a departure from the rules of procedure obtaining in general surgery, as in amputation, etc., is essential to success; that in civil practice the ideal operation is to attempt to save all tissue compatible with utility, and that an immediate operation is to be preferred, the primary the exception. Just the reverse should be the rule in railroad injuries to secure good results, the conservation of tissue being of minor consideration. First, and above all else, give time for reaction to fairly set in, that the involvement of the vascular system may be accurately determined, and serve as a guide to the extent of tissue to be sacrificed. There is abundant cause why reaction should be well established in railroad injuries before an operation is done. In the crushing and mangling not only are the nerves subject to such destructive violence as to destroy their function; but likewise the vascular system suffers from the same cause, hence the absolute necessity of awaiting reaction in all major cases, as loss of nervous innervation in any part will determine to a great extent the site of election. The regeneration of nervous tissue will be too tardy to save the soft parts when the integrity of the nervous system has been seriously impaired; hence the wisdom of the rule to cut wide of the injury in immediate operations in railroad traumatisms is confirmed by both observation and experience, and although the soft parts seem to be intact, yet the uniform sloughing attendant on immediate operations teaches us to estimate duly the wide difference in the causation of injuries, one local *per se*, the other involving in the violent stretching and tearing of the soft parts the whole nervous system.

Unlike bone and nerve tissue, the blood vessels when their continuity is destroyed can not be reproduced or their potency restored, hence the entire dependence of all other parts of the economy upon the unbroken continuity and functional integrity of the blood vessels, for while compensatory collateral circulation may in time be established, yet this wondrous provision of nature may prove wholly inadequate to supply in sufficient amount the blood pabulum so essential to the life of the part. To this inherent, tardy delay in the development of the collateral circulation the loss of many parts is due, even when concomitant injuries are of a trivial nature. Looking to attainable ideal results, it is well to consider the relative vital powers of resistance of the various tissues, in order to fully estimate the loss of nervous innervation when the vascular supply is inadequate, due to their common impairment. In many cases the nerve lesion is disproportionately greater than the vascular, and thus fail of rapid reparation for want of nervous innervation. In some injuries due

to wrenching, stretching, and tearing, the tortuosity of the arteries leaves them comparatively intact, whilst the nerves suffer such stretching and physical injury as to sever the continuity of their axis cylinders, resulting in abolition of function more or less enduring. As effect follows cause, so may we ascribe the greater shock and collapse as distinctive and peculiar to railroad injuries; not sufficient blood has been lost nor destruction of tissue to thus overwhelm and imperil life, but in the general injury to the nervous system may we find abundant cause.

Dressings.—Means should be adapted to ends. Hæmostasis should be affected by torsion and this method greatly lessens the labor of the surgeon in the future management of the case and exempts the patient from complications due to other methods. In determining the choice of local applications to be used in any given case a thoughtful discrimination is demanded. As in medicine, so in surgery, each particular case is a law unto itself. In each individual case the surgeon is confronted with conditions, ranging from a simple aseptic incised wound to "one all tattered and torn," beset with auto and exoseptic materies morbi. The conditions are so diverse that manifestly the treatment so imperatively demanded in the one case would only delay or prevent restoration in the other. The disinfection of pathogenic tissues is the fulfillment of ideal surgery as to dressings, a conception of science upheld by incontrovertible facts, and when an infected wound is once rendered aseptic by the use of disinfectants their further use is not only contra-indicated; but detrimental in the extreme by inviting destructive and devitalizing stimulation, in many cases eventuating in necrosis instead of normal repair.

EXCISION OF THE FEMUR FOR PATHOLOGICAL FRACTURE FOLLOWING OSTEO-MYELITIS.

By ALEXANDER J. MULLEN, JR., A. M., M. D., Michigan City, Ind.

The preponderance of opinion among surgeons is antagonistic to excision of the shaft of the femur. I have, however, presumed to put this procedure into execution and in doing so can conscientiously abide the result.

Andrew Mentag, age 40 years, a yard master for the Michigan Central Railroad Company at Michigan City, Ind., had an abscess develop on the outer aspect of the left thigh, bordering on the popliteal space. A deep incision relieved a large quantity of dark brown pus. A few days later, January 1, 1893, the patient in walking across the room slipped and in placing his left leg out to regain his equilibrium the weight thrown upon that member caused a fracture of the femur about 5 centimeters above the junction of the lower and middle thirds. The patient gave a history of severe pain in the knee of this leg, beginning three weeks previous to the accident.

Clearly a pathological fracture following osteo-myelitis. The following day, under the strictest aseptic conditions and surroundings, the thigh was opened by a long incision on the outer side, the fragments brought to the light and found to be necrotic and perforated with numerous cloacæ; so much so that 8 centimeters were then taken off of upper fragment and 6 centimeters off of the lower, using a chain saw. The chisel was then freely and extensively used, and the diseased medulla thoroughly scraped out with a sharp spoon.

The cavity was washed out with a $\frac{1}{1000}$ solution of bichloride of mercury, followed by a $\frac{1}{3000}$ solution. Iodoform was dusted throughout the cavity, a posterior splint was applied, and the space between the bones filled with Dr. Senn's decalcified bone.

Not being certain of perfect asepsis obtaining in the cavity, the wound was not sutured; but packed with iodoform gauze. An ample dressing of absorbent cotton and antiseptic gauze was applied and held firmly by a few turns of a bandage. This pad was kept moist with a saturated solution of boracic acid, and the leg placed in suspension.

The morning after the operation the patient's temperature reached 101.5°; on the third day it went up to 102.5°; removed dressing and found a small pus pocket at

the superior edge of the incision; scraped the parts and used a $\frac{1}{7000}$ bichloride solution at point of sepsis. Irrigated cavity with a $\frac{1}{15000}$ solution and repacked. Since that date, (January 5, 1893), the temperature has not been over 99.2°; nor the pulse over 88. The wound remained aseptic throughout the process of closing. The wound has filled in and left a large but healthy cicatrix. There is good, solid, and firm union, and there is less than an inch shortening. Flexion at the knee is perfect, and the patient bids fair to have as serviceable a leg as he ever had.

The result shows the merits and proves the certainty of decalcified bone serving as a framework or columella for the granulation tissue that emanates or sprouts from healthy bone.

The ring of skepticism that hovers over the heads of divers surgeons relative to the efficacy of Dr. Senn's decalcified bone chips will, I sincerely believe, eventually give way to a halo of belief and confidence commensurate with the merits of bone implantation.

HISTORY OF RAILWAY SURGERY AND RAILWAY SURGICAL ASSOCIATIONS.

By C.B. STEMEN, M. D., LL. D., Fort Wayne, Ind.

The history of railway surgery is coëval with that of the building and operating of railways, but not until recently has there been any distinction made in regard to the treatment of injuries resulting from the heavy machinery of our railways and those resulting from other causes. For a long time the profession has recognized military surgery as a specialty and surgeons have given special study and preparation in qualifying themselves as military surgeons and this we believe has resulted in great good to the armies of all countries. Surgeons especially prepared for the work of treating gunshot wounds will be more successful in the treatment of such injuries than those who, although they may be thoroughly qualified as general practitioners of medicine and surgery, have not given special attention to this work. We find no fault with the military surgeon; neither with those who give special attention to orthopædic surgery or any other specialty, but we plead for the specialty of railway surgery.

As stated before, immediately after the building and operating of railways, it was found necessary to appoint surgeons known as railroad surgeons, who could be called upon to treat the injured employé or passenger. This was only done by a few of the leading corporations in an early day, but soon it was found almost a necessity for every railroad corporation to have surgeons in the larger towns and cities through which their roads passed. Up to the time of the war of the rebellion in this country we are unable to find systematic arrangements of any railway company regarding its surgical service. We know of a few men who are now in the surgical service of some railway companies who were employed by the same company before the war. Dr. J. J. Buchanan, of Allegheny City, Pa., was surgeon for the Pennsylvania Railway Company before the war, and still holds the position. But, as stated before, there was no systematic arrangement made by any railway company that we have any knowledge of prior to 1861. We find the following in the annual address of Dr. J. W. Jackson, the first president of the National Association of Railway Surgeons, delivered at the meeting held in St. Louis, Mo., May 2 and 3, 1889:

My army experience gave me familiarity with the Marine Hospital system of the United States, and it was this familiarity and experience that furnished many of the hints and suggestions that I have since put into practical effect in hospital departments of the Missouri Pacific and Wabash Railway systems. In 1867, as local surgeon of the Missouri Pacific system, I first became especially interested in the subject of railway surgery. The frequency of accidents among the employés of the road and the deplorable results in many cases owing to the lack of comfortable quarters and accommodations and the absence of anything like system or concerted action on the part of employers and employed first suggested to me the possibility of something like a hospital system, having a recognized connection with the road itself and especially adapted to the peculiar work on hand. The local nature of my position and the narrow limits of my jurisdiction prevented me, however, from putting any of my theories into practical operation until the year 1872, when I became chief surgeon of the Atlantic and Pacific Railway Company, extending from Pacific, Mo., to Vinita, Ind. Ter., and from St. Louis to Atchison, Kans.

This extended jurisdiction created more crying necessities, as well as larger opportunities, and it was on this line that my first railway hospital was established.

As may be imagined, it was a very crude affair, the whole equipment consisting of two beds in the back room of my office at Pacific and such apparatus as I had acquired for the purpose of my private practice. We did, however, introduce the feature of appointing local surgeons along the line of our road, who looked after our employes who were seriously injured near their several stations, and took care of them at boarding houses, section houses, and hotels. The success of this first venture was not very brilliant. We found that a large majority of those employés who were so seriously injured as to require amputations died for want of proper care and nursing. This demonstrated the necessity of combining the nurse with the surgeon, under the same general direction, to insure the best results.

Besides, the bills for services, professional and otherwise, not being subject to inspection, were enormous, and the road was compelled to pay extravagantly for beddings, carpets, furniture, and even the paper on the walls of hotels, claimed to be ruined by surgical operations. The company refused to pay many of these bills, and then both parties made the surgical department the object of its complaint and abuse. My profession degenerated into auditing small accounts and chasing up elusive details. Few were cured, none satisfied, and the chief surgeon least of all. This pretty clearly demonstrated the necessity of union in the operating and supply departments of the system and of a general supervision and inspection of the accounts of the department by the financial officers of the road. This first trial was instructive, if nothing more, and my efforts were then directed toward remedying the defects that it disclosed. In 1873 I proposed to our company to organize a hospital upon the plan of the United States Marine Hospital Department; but they did not readily fall in with the plan. I urged the matter from time to time, but without success until the spring of 1879, when I learned that the Central Pacific Railroad had a hospital department, with headquarters at Sacramento, Cal., and supported by assessments upon its employés. The experiment tried elsewhere operated as an entering wedge with our company. In July, 1879, I made a trip of investigation, and through the kindness of Dr. Nixon, chief surgeon, was made thoroughly familiar with the workings of the California system, and upon explaining it to our management, was directed to organize a similar system on our road.

Col. Talmage, general superintendent, issued circulars notifying all employés that on and after July 1, 1879, a deduction of 50 cents per month would be made upon the pay roll from the salary of each employé for the purpose of maintaining a hospital. Then came the storm. As was expected, we met with great opposition, and not only from employés, but from newspapers along the line of the road, some of them even claiming that we were organizing a gigantic steal to be divided between the vice-president and general manager, the general superintendent and chief surgeon.

This abuse and misrepresentation was so continuous and became so unbearable that I was at length driven to write an answer to these charges, fully explaining the purpose of the hospital department and its management. Among other things, I stated that it would be conducted in as systematic a manner as any department connected with the operation of a railroad; that the deductions would be made upon the pay roll by the company through its auditor, and the amount thus collected paid over to the company's treasurer; that the chief surgeon's salary and that of his assistants and hospital attendants would be paid exactly as in the case of all other officers and employés of the company, and that all necessary articles and supplies would be purchased by the superintendent of supplies of the hospital department, upon the requisition of the chief surgeon, approved by the general superintendent; that all vouchers would be made by the chief surgeon, and would then be sent to and approved by the general superintendent, thus leaving no room for peculation or fraud. I selected from the auditor's office, as superintendent of supplies, Mr. M. B. Wesson, a gentleman of large experience and well known to be of unimpeachable integrity. Toward the employés we took the ground that no deduction had been made without thirty days' notice of our intention, and any who objected had ample time to secure other employment before the trial was made. The St. Louis Globe-Democrat and the Sedalia Democrat kindly published my article and after that we heard no more from the newspapers; but the grumblings among the employés had to be satisfied by practical experience with the system.

We rented a large hotel at Washington, Mo., on the line of the Missouri Pacific Railway, and furnished it comfortably and neatly, and were ready for the reception of patients at the appointed time. During the first month our hospital was filled, many of the inmates being among the former most vigorous opponents of the system. The management and equipment, at first new and unsatisfactory, constantly improved with experience, and the patronage increased proportionately. The number of patients treated during the first year greatly exceeded our anticipation, and went far toward establishing the system upon a firm footing in the minds of friends and enemies alike.

Meantime the Missouri Pacific system was constantly spreading. The Central Branch of the Union Pacific Railway, the Missouri, Kansas and Texas, the International and Great Northern, and the Texas and Pacific railways were successfully added to or controlled by it and the jurisdiction of the hospital department was correspondingly extended. This necessitated the removal of our main hospital to Sedalia and the building of a new hospital at Fort Worth, Tex. It is a noteworthy fact that the employés of these newly acquired roads had heard so much and so favorably of our hospital department that they accepted its introduction among them without a murmur and even with eagerness. During the year 1881, I think, Dr. W. B. Outten, present chief surgeon of the Missouri Pacific Railway, established a hospital on the St. Louis, Iron Mountain and Southern Railway at Carondelet. In 1882 we joined forces and built a very elaborate hospital at St. Louis for the joint use of both roads, and later a very fine one at Palestine, Tex., for a like purpose. In the year 1884 the Wabash came under the control of the Missouri Pacific system and several new hospitals were added. This joint hospital system was very successful and continued until the Wabash system passed into the hands of receivers, when I accepted service with the Wabash and Dr. Outten succeeded me as chief surgeon of the Missouri Pacific; and it was then decided to separate the hospital systems of the two roads.

Meantime, as chief surgeon of the Wabash system west of the Mississippi, I had already established a hospital at Kansas City. Dr. Outten, acting in like capacity east of the Mississippi, had located others at Danville and Springfield in the State of Illinois. In 1885, after the separation of the two departments, we organized still another at Peru, Ind. We met with very stubborn resistance east of the river, the State of Indiana, by its Legislature, even going so far as to pass an act prohibiting railroad corporations from assessing their employés for the maintenance of hospitals. Fortunately the act was imperfectly drawn, and became a dead letter in consequence. An attempt was made to pass a similar act in Illinois; but failed and latterly there has been no tendency toward restrictive legislation of this nature. In short, the hospital system is now very popular with both employés and citizens familiar with its workings. In proof of this I may cite the Indianapolis, Peru and Chicago, formerly a part of the Wabash system, which is now patronizing our Peru hospital at the request of its employés.

To Drs. J. W. Jackson and W. B. Outten belongs the honor of being the pioneer chief surgeons who organized and successfully maintained the railway hospital plan, the former being the chief surgeon of the Wabash Railway at the time of his death, which occurred March 13, 1890, and the latter being the chief surgeon of the Missouri Pacific Railway Company. The Union Pacific, with Dr. J. W. Galbraith as its chief surgeon, who is also president of the National Association of Railway Surgeons, is operating the hospital plan, and has some very excellent hospitals. The Atchison, Topeka and Santa Fe Railway Company also operates the hospital plan, with Dr. Hogehoem as its chief. There are other companies now operating under this plan and we believe that many others will adopt it at an early date. The Baltimore and Ohio Railway Company was, we believe, the first to adopt the relief department; that is, by making an assessment each month and deducting the amount from the wages of each employé, they provide a fund for the relief of the unfortunate, sick, or injured.

The Pennsylvania Company has adopted this plan and has found it very successful, and it has accomplished very much in relieving those who have been unable for any period, either on account of sickness or injury, to labor and secure the regular wages. We hear of other railway companies who are about to adopt this plan of providing for their employés. We believe that in order to make the relief department entirely satisfactory, a hospital plan should also be carried out, having the relief and the treatment of the sick and injured united. There are some of the great railway systems that have local surgeons, without any chief to direct in the affairs of the surgical service, but most of the railroad corporations of this and all other countries recognize the necessity of having surgeons especially employed to do this special work.

THE HISTORY OF RAILWAY SURGICAL ASSOCIATIONS.

At the annual meeting of the Surgical Association of the Wabash Surgeons, held in November, 1892, at Danville, Ill., I was requested to write a paper on the subject of the History of Railway Surgical Associations and present it at the meeting of the Pan-American Medical Congress at this time.

In accordance with that request, I have prepared the following. At the meeting of the National Association of Railway Surgeons at Old Point Comfort, Va., in May, 1892, I presented a short paper on the same subject, and as history, when correctly written, is the same at all times, much of this paper will be the same as the

one read at the meeting in 1892; but some very important matters will be here presented not recorded at that time.

During the early part of the winter of 1881, Dr. J. T. Woods, of Toledo, Ohio, who was then chief surgeon of the Wabash Railway east of the Mississippi, made a visit to the city of Fort Wayne, Ind., and at that time it was decided to call a meeting of the surgeons for the purpose of considering the propriety of organizing a railway surgical association. The call was made to meet at Decatur, Ill., on the 25th of January, 1882. At the time named a large number of surgeons assembled, and, after hearing two able papers read by the chief surgeon, an organization was perfected by electing Dr. J. T. Woods president and the writer secretary and treasurer.

The following surgeons were present at the meeting:

Dr. J. T. Woods, Toledo, Ohio, chief surgeon; Dr. J. S. Gregg, Frot Wayne, Ind.; Dr. C. B. Stemen, Fort Wayne, Ind.; Dr. W. H. Bell, Logansport, Ind.; Dr. J. C. Hearne, Hannibal, Mo.; Dr. A. L. Elder, Fisher, Ill.; Dr. C. V. Rockwell, Taylorville, Ill.; Dr. John C. Walker, Indianapolis, Ind.; Dr. R. W. McMahan, Quincy, Ill.; Dr. A. D. Coe, Mexico, Ind.; Dr. P. H. Barton, Danville, Ill.; Dr. F. W. Beard, Vincennes, Ind.; Dr. A. H. Shaffer, Huntington, Ind.; Dr. Geo. F. Beasley, Lafayette, Ind.; Dr. W. B. Graham, Noblesville, Ind.; Dr. T. B. Campbell, West Lebanon, Ind.; Dr. Alex. J. Mullen, Jr., Michigan City, Ind.; Dr. W. J. Chenoweth and Dr. Cass Chenoweth, Decatur, Ill.; Dr. D. J. Swarts, Butler, Ind.; Dr. Wm. J. Scott, Kokomo, Ind.; Dr. G. W. Parker, Cairo, Ill.; Dr. A. U. Williams, Sullivan, Ill.; Dr. A. T. Darrah, Tolono, Ill.; Dr. N. N. Vance, Bement, Ill.

It was voted that the organization should be known as the Surgical Society of the Wabash, St. Louis and Pacific Railway east of the Mississippi River. It was ordered that the paper read by Dr. Woods, together with the proceedings, be published in the Fort Wayne Journal of the Medical Science. This was the first railway surgical association ever organized, and it is with great satisfaction and some degree of pride that we can state that this organization has had annual meetings up to the present time; in fact, the last meeting held, in Danville, Ill., last November, was one of the best ever held, and for eleven years it has been doing much for the advancement of accidental surgery and for organized systematic work on the hospital plan. We also take pleasure in stating that from the very first up to the present the surgeons have had the earnest support of the officers of the company, all coöperating in carrying forward and developing a plan of taking care of the injured and sick employés which we believe will be adopted by many of the railways of this country, for certainly the years that this plan has been in successful operation have clearly demonstrated that it is not only a good one, but the best that can be adopted. There are many railways operating the hospital plan which do not have a regular surgical association. In our meetings we frequently have been honored by the presence of the superintendents, both division and general, and also by the general manager, Charles M. Hays, Esq., who has always manifested a very great interest in the success of the surgical association of his road.

Some time in September of the same year, 1882, Mr. C. D. Law, superintendent of the western division of the Pennsylvania lines, known as the Pittsburg, Fort Wayne and Chicago Railway, appointed the writer to meet with Dr. J. J. Buchanan, of Pittsburg, who had been appointed by Mr. A. B. Starr, the superintendent of the eastern division of the same road, for the purpose of arranging for a meeting of the surgeons of the Pennsylvania Company. We met and arranged to call a meeting in Crestline, Ohio, October 18, 1882. The surgeons were informed of the proposed meeting, a number assembled, and an organization was perfected by electing the writer president, Dr. J. J. Buchanan vice-president, and Dr. P. B. Young secretary.

The following surgeons were present: Drs. A. I. Scott, Beer, Reynolds, T. Davenport, W. H. Myers, B. S. Woodworth, C. B. Stemen, G. W. McGavern, R. W. Thrift, M. C. Cuykendall, P. B. Young, B. McConnell, Johnson, D. McKinney, Firestone, J. H. Tressell, and J. J. Buchanan. This was the second railway surgical associa-

tion organized in this country, and it is also with great pleasure that we note that it held regular semiannual meetings up to 1888, when the national association was organized, and ever since then has held annual meetings, and has also accomplished much in developing the great results of organized railway surgery.

In May, 1887, at the meeting of the Pennsylvania Company surgeons, it was proposed to call a meeting for the purpose of forming a national association of railway surgeons, but no definite action was taken. But at the meeting of the same year in Pittsburg, Dr. A. W. Ridenour, of Massillon, Ohio (now deceased), offered the following resolution, which was adopted:

Resolved, That it is the best interest of the various railroad surgeons' associations, of the companies they represent, and of railroad sanitation that a national meeting of railway surgeons, representing as many roads as may be induced to respond, be held; that this association take initiatory steps by sending out invitations to the various railway surgeons' associations—to chief surgeons where no association exists, to individual surgeons where no chief exists—to meet at Pittsburg, St. Louis, Chicago, Philadelphia, or New York in June, 1888, there and then to perfect an organization to be known as the American Association of Railway Surgeons.

The president, Dr. Firestone, appointed as a committee to act upon this resolution Dr. C. B. Stemen, chairman, Dr. J. J. Buchanan, secretary, Dr. S. S. Thorn, Dr. J. H. Tressel, and Dr. A. W. Ridenour. This, then, was the initiatory of this great surgical association. As will be seen, the organization originated in the East, in the city of Pittsburg, where the first committee was appointed, and the surgical association of the Pennsylvania Company has the honor of making the first move, so that the honors between the Wabash and the Pennsylvania Company are about equal, the Wabash the first to organize, the Pennsylvania second; the latter the first to propose the calling of a meeting for the purpose of organizing the national association, and the Wabash the second to appoint a committee to coöperate in calling the meeting, as will be seen by the following action taken at the meeting at St. Louis, December 21, 1887:

The propositions from the surgeons of the Pennsylvania Company in regard to holding a national meeting of railway surgeons was presented, and Drs. C. B. Stemen, J. W. Jackson, and C. B. Higgins were appointed a committee to confer with the surgeons of the Pennsylvania Company.

I should have said that the surgical association of the Chicago and Atlantic also appointed a committee to assist in the calling of the meeting for the purpose of organizing the national association. Since then many others followed.

The committee sent out the following circular to general managers:

SIR: The enclosed circulars are to be sent to the surgeons of your road. Will you be kind enough to have them sent to all the local surgeons on your line?

The National Association of Railway Surgeons will, we trust, do much to advance the interest of railway surgery in this country, and we desire your coöperation in this movement of organizing such an association of the surgeons whose duty it is to take care of the injured employes and passengers. Will you arrange for transportation for all who may desire to attend the meeting at Chicago? We very much desire that your company shall be represented at this meeting.

Yours, truly

C. B. STEMEN, M. D.
J. H. TRESSELL, M. D.
R. L. SWEENY, M. D.

The committee gave the chairman unlimited power to send out circulars and invitations to railway officials and chief surgeons, to meet in Chicago June 28, 1888. We received very many letters, some of a discouraging nature, but others full of encouragement. Especially do I desire to say that from 600 letters sent to railway officials stating the object of their meeting and asking their coöperation and free transportation for the surgeons there was but one unfavorable reply, and that came from Boston. I am very sorry that I can not find this letter. Its writer was the only one among all the railway officials of this great country who refused or in any way answered me discourteously. Consequently we felt greatly encouraged for the reason that it was not for self-aggrandizement or for any special benefit that might come to the members of this committee that the very arduous task was undertaken, but from the painful fact that the practice of accidental surgery, especially that of

railway surgery, involving injuries produced by heavy machinery, was not as fully understood by the great army of railway surgeons as it should be, and conviction that if the surgeons throughout this great land of ours should meet and discuss the various and serious accidents that are so frequently met with great good would result not only to the unfortunate injured, but also to the railway companies. Hence the work was undertaken.

One incident will explain how sanguine even the committee was in reference to the attendance at this meeting. The arrangements had been made to hold the meeting in parlor O of the Palmer House, which would probably have seated not more than 40 persons, but we found more than 200 present at this meeting. Dr. J. W. Jackson, then the chief surgeon, was elected its first president, Dr. C. B. Stemen, the recording secretary, Dr. E. R. Lewis, corresponding secretary, and Dr. R. Harvey Reed, treasurer. The total number who registered and paid their fee at the first meeting was 189. Next year there was received 270 additional members, and in 1890 there was added 179, making in all 638 members.

The number of members has steadily increased until at the meeting in Omaha last May there were over 1,500.

There are to-day many railway surgical associations; several States have organized societies, and many of the railways have their surgical associations.

LITERATURE ON RAILWAY SURGERY.

About the time of the first organization of railway surgeons, January 25, 1892, the Fort Wayne Journal of the Medical Science began to be published in the interest of railway surgeons. It was made the official organ of the Wabash Railway Surgical Association, and also that of the Pennsylvania Company's Surgeons, and has continued until the present to be published in the interest of this specialty. In 1889 at the organization of the National Association of Railway Surgeons, it was made the official organ, but at the meeting of the Association in St. Louis it was agreed to publish the Journal of the National Association of Railway Surgeons, the author being its editor. This was continued until the meeting at Buffalo, N. Y., in 1891, when the committee on publication abandoned the Journal, and has since then published a department of surgery in the Railway Age; also publishing each year a volume of transactions.

In 1891 the author of this paper prepared a small volume on railway surgery, which has been before the profession now nearly three years. Quain's Dictionary has a short chapter on railway surgery and a few other works have responded to some diseases and pathological conditions, which they claim are caused by railway injuries. But outside of the above-named publications, there is no literature on the now well established and rapidly growing specialty.

We trust that in the near future some of our able men in this department will give to the profession some more valuable literature.

THE METHODS OF TAKING CARE OF THE SICK AND INJURED ON FOREIGN RAILROADS.

In 1887 I was requested to visit the Old World and make some investigations as to the methods employed by the railways of foreign countries in taking care of their sick and injured. I found that railway surgery was rapidly becoming the leading speciality of medical and surgical practice in foreign lands as well as in the United States, and that special study and preparation for the successful treatment of railway injuries was required.

We found that a majority of the railways in the old country have in their employ a chief surgeon, with many local surgeons. Some roads have a surgeon at every station, if the stations are only a few miles apart. The chief surgeon is charged with the duty of selecting the local surgeons and recommending them for appointment to the general manager; also that of seeing that these surgeons attend faithfully to their duties, and in doing this he is required to give nearly his entire time to the service of his company. He is also required to look after the sanitary condition of the company's coaches, shops, and stations. The first railroad office I visited was that of the great Midland route, running through the north of England, and from Liverpool to London. I found the officers very kind and courteous and disposed to advise me freely and fully in regard to the methods employed by their corporation in taking care of the sick and injured. The next large railroad office visited was the London and North Western. The officers received me, not as an intruder, but as one coming with a proper mission, and one which they regarded as very important.

In conversation with one of the officers he remarked that in view of the great army of men employed in moving the produce of all nations, and also the many hundreds of thousands of passengers who are daily carried over the lines, exposed as they are to the many dangers incident to railway travel, it was, in his opinion, a very laudable undertaking for me to make such an extended tour of investigation, for, said he, the surgery of England has largely to do with cases of an accidental character and the majority of these are among railway employes. I shall

not take up the time in presenting in detail the methods in practice among the different companies, as they are in the main very near alike. The London and Northwestern, the Great Western, the Midland, the Great Northern and the London, Chatham, and Dover railways, with those of Ireland and Scotland, have much the same arrangements.

The requirements are that every man or "lad" entering the service of the company must be in good health, of sound body, and present a certificate thereof from a physician of reputable character and standing. He must also pay a weekly assessment to a fund for the purpose of maintaining a provident society, to which each employe as well as the company make regular contributions. In case of sickness or injury to the employe he receives a certain fixed amount or benefit per week. Provisions are also made that in case a member of his family be taken sick he shall receive a weekly benefit, and at the death of any member of his family a sum not to exceed, in some cases, £20 (nearly $100 in our money) is paid as funeral expenses.

The railroads in France, Switzerland, Austria, Germany, and Belgium are all operated on much the same principle, having a provident society to which the company makes liberal donations, and requires the servants to make a weekly contribution to the same fund. I did not find a single road in all my travels where the employes are not required to pay an assessment, and such assessment is invariably deducted from their wages.

CONCLUSION.

When we look back to the time of the first organization of railway surgeons, in January, 1882, and remember the opposition offered by some of the members of the profession, we are surprised at the wonderful success that has been attained by the friends of the railway surgical associations. The objects of these organizations are to better qualify the surgeon for his responsible work, and to give him an opportunity to interchange thoughts and relate experiences in the management of the many cases which he is called upon to treat. It is not for the increase in wages and for less hours of labor, but to prepare the surgeon to do good and relieve the unfortunate injured. This must frequently be done without assistance, and upon prompt action will depend the life or lives of many injured. There is no time then to consult text-books, no time to call professors of surgery, or even a consulting physician, but the surgeon must act at once, and upon his good judgment and prompt decision depends, it may be, the life of the unfortunate.

The railway companies and the employes are greatly indebted to these railway organizations for the high standard of the surgical service, and we firmly believe that through these organizations much good will yet come to the railway employes and travelling public. Already the sanitary arrangements of our railway coaches are being considered, and we believe will be greatly improved, and many precautions are now taken to avoid accidents, and many preparations are made for the speedy and prompt treatment of those who may be injured. In all of these organizations it is of the greatest importance that the surgeons act in complete harmony with the officers of the railways and secure their hearty coöperation and support.

RAILWAY SURGERY AS A BRANCH OF THE SCIENCE AND ART OF SURGERY.

By EUGENE R. LEWIS, A. M., M. D., Kansas City, Mo.

As the avalanche toppling from the highest mountain's crag, gathering strength at each onward step from its environment, till we find it the almost irresistible mass moving upon its surroundings with Herculean force, so we find surgery of to-day, starting from the most obscure and unscientific source, now wreathed in science and fortified by art, till it stands the wonder of progress in the arts and sciences of to-day. Its rapid strides are more than wonderful to those of us who twenty-five years ago drank at the Æsculapian fountain, beneath the guardianship of the Nestors of our much-loved profession of that date; but the dogmas and theories

so much relied upon then have given way to the easily demonstrated truth, and we now stand upon a pathology in many respects so different from the old demonstrated facts that it has raised our profession to a science, and our work of to-day certainly proves the art. And we are not "clinging to December while the earth is in her June."

Ancient surgery, as it has come down to us of the present day, presents many varied hues and relations to the sciences and arts of the present day, and railway surgery, like all offshoots of a parent stem, has not failed to have its presence questioned, not by the mother, but most likely by the senior offspring of the living family of to-day. It can be accepted without question that no art ever existed without a demand, and that science is and can only be founded on truth. So the science and art of surgery, based upon truth and demand, has to-day found a fixed place among the arts and sciences; and as that place could not be fixed by a demand, so now we are confronted by the most urgent demand for an art based upon a science, bearing especially upon the demand made for the special and emergency work, the outgrowth of an entirely new industry which is so rapidly encompassing the world. If we keep pace with the age in which we live we must be "up and doing," and I do not hesitate to say that the work done by this branch of surgery will compare most favorably with that done in any branch of that great science and art which we all so greatly honor and highly praise.

I have personally interviewed many experienced railway surgeons, and listened to their rehearsal of scores of cases in which experienced physicians and surgeons had overlooked the gravity of what may be termed the minor accidents of railway surgery. These mistakes are not made because the physician or surgeon is not qualified to practice his profession; but, most often, on account of an improper realization of the forces at work which caused the injury. A mistake of this kind rarely fails to be brought to light, owing to the environment of all railway injuries; and I can not properly convey to you my ideas as to the great necessity and importance of care and experience in every railway accident, for so important is such care and experience, not only for the patient's good, but for the good of all, that I firmly believe that such conditions entitle this branch of surgery to be considered a special branch of the practice, at least. The same general principles must underlie this as other branches of surgery, most prominent among which I may mention military and altho-military surgery, which has been for years recognized as a special branch of surgery. I claim that military surgery has no prior claim over railway surgery other than antiquity.

I am prepared to believe that wars and the injuries inflicted thereby had much to do with the origin and development of surgery. And it has taken time and experience, coupled with necessities, to develop surgery in its various branches; and not least may be mentioned railway surgery, with its great demands of the present day. But few armies boasted of such numbers, and they rapidly decreased and disorganized, while the army of auxiliaries to the railway service are increasing and have enlisted for life, thus relieving railway surgery of any spasmodic phases, but offering opportunities for crystallizing itself into the gem of gems of traumatic surgery. Surgical authors on both sides of the Atlantic have already dignified railway surgery with newly coined phrases which were never dreamed of before a railway track was laid, and too often dreamed of, in my opinion, now that many miles of track has been even relaid.

I do not belong to that class who believe that molecular changes occur in healthy organisms by the continued jar of the rail, but I belong to that class who believe that molecular changes occur from diseased conditions, either acquired or hereditary, on or off the too-often, abused benign rail. Antecedent and acquired history, without perceptible lesions, must in the almost universal number of cases clear up the hidden malady that is too often laid upon the imaginary pernicious rail. A differentiation in these cases I conceive to be the task of an expert.

In no industry with which I am familiar is there so fertile a field for deception as is offered to the man overtaken by accident upon a railroad; so fertile is the field that for the time being many persons even fool themselves, and when freed from the railway complications really awake to be themselves again. The influences of the

mind over the body in many instances is nothing short of phenomenal, and, strange as it may seem, this condition actually complicates the task of an honest surgeon, to what extent in many cases I feel it is impossible to tell. When you have normal function in all appreciable structures of the body, and yet have to deal with conditions which can only be expressed, not shown, then it is, I feel, that railway surgery requires the astuteness of a clever physician or surgeon to decide.

The man caught in a railway accident often reminds me of a man who carries a large accident insurance and can not be convinced he is really well until the accident company has his receipt for all claims. In stating matters of this kind, I call upon all railway surgeons of experience to review his own observations; and I feel that those not familiar with the work can hardly appreciate the great frequency of their occurrence, and under such conditions I am constrained to believe that railway surgery is without a peer. But, gentlemen, aside from this phase of our surroundings, which present such a congerie of symptoms, I would call your attention to the great multitude of physically injured upon our many railways in the States alone. About 29,000 killed and injured during the last year. Of this number a little less than 3,000 were killed. These figures refer to employes only. Of passengers 293 were killed, and others injured numbered 2,972, thus showing what a vast amount of surgical work must have been involved. In attention to the 40,910 killed and injured in twelve months (these figures were compiled by our president), making an average of 3,409 per month, 113 per day, or about 5 every hour, we see the vast amount of emergency work occurring in a special industry whose environments certainly entitle their injured to that expert service which educated experience alone can give the surgical attendant. The president of the Medico-Legal Society of New York, Mr. Clark Bell, in a paper before the National Association of Railway Surgeons, at Omaha, Nebr., June 2, 1893, said "Every railroad should have its surgeon. He is a necessity as much as its lawyer, its president, or even its superintendent. Both professions of medicine and law are now a necessity for the proper management and conduct of a railway."

Possibly but few men in this country are better fitted to pass judgment on the railway surgeon than Mr. Clark Bell, and if we concede these statements to be true, and certainly we all do, then how more than important it is that this man, the railway surgeon, should be especially fitted for his great responsibility. His mistakes in the management of his case can not be carried to the superior courts for proper adjustment, for already the end has been reached so far as the patient is concerned, and the time for the exercise of proper skill has passed and repair is impossible. Unwarranted impairment or the grave shuts out all relief. Again, this same jurist recommends; "that a section in railway surgery be formed in that society (the medico-legal), under a general chairmanship to be annually chosen, with a board of vice-chairmen composed of lawyers and railway surgeons selected from various sections of the country"; and suggests: "that a joint committee of conference be named by the National Association of Railway Surgeons and the Medico-Legal Society with power to agree upon a place and basis of organization." And I am happy to be able to say those committees are now not idle. The fruits of their labors we hope soon to be able to chronicle. This Medico-Legal Society has upon its rolls to-day many members of this section, some of whom I can only name here, viz, Dr. C. P. Conn, of Concord, N. H.; Dr. Nicholas Senn, of Chicago; Dr. Eads, of Texas, and others whose great interest in this branch of surgery must sooner or later crystallize into the useful gem which will aid in adorning the crown of railway surgery of the nineteenth century.

Specialism in surgery, we know, dates back to the time of Hippocrates, if not much farther, for the Hippocratic Oath, as given in Dunglison's practioners' reference book, must convince all not already convinced. The New York Medical Journal, in reveiwing the volume of transactions of the meeting of the National Association of Railway Surgeons held at Old Point Comfort, Va., in May 1892, made this startling criticism:

"This volume contains a record of the proceedings of this vigorous organization at its meeting at Old Point Comfort, Va., in May, 1892, as well as the papers that were presented for the consideration of the meeting. The papers were on various topics of interest to the railway surgeon, though the majority, as might be imagined, were on surgical subjects." How a reasonably intelligent paper upon railway surgery could fail to be a paper on a "surgical subject," I cannot comprehend, for it certainly must be surgical from the nature of the subject dealt with. Genito-urinary surgery, gynecology, opthalmology, military surgery, etc., have long since ceased to be questioned as specialisms in the practice of surgery, and when we compare the importance and demand of the various specialties in surgery I can admit no specialty to stand upon more rational ground than that of railway surgery. Its maximum weakness can be found only in its youth, the necessity for its rapid development is so great that its real growth is far in advance of its age, and its importance and real claim to existence, I am proud to be able to say, has been thoroughly canvassed and overwhelmingly recognized by this the greatest Medical Congress of the Western Hemisphere.

In discussing this question I have not felt it necessary to call attention especially to the different forms of force in producing the injuries or pathological conditions in which we come in contact. The different varieties of force with which we come in contact, producing the various traumatic lesions with which we as surgeons have to do of necessity, greatly aid in the proper diagnosis and an intelligent prognosis. Who can compare the environments of the surgeon of to-day with his environments one hundred years ago, to say nothing of those of one thousand years ago? Old Galileo, facing his dungeon cell, was not afraid to say, "She moves; yes, she moves, nevertheless." And so it is with the science and art of surgery, the limitation of the human intellect and an early limit to man's physical endurance must of necessity specialize as the field grows greater, and when we compare the present with the past can we see any other solution save specialism?

The splitting up of the practice of law in the specialties is but the necessary outgrowth of an enlarged field of law, and the practice of any special branch must still be the practice of law. So a comparison of the two professions might at least be instructive, if not convincing, and an essay upon the law of evidence is of necessity an essay upon law; so, when our New York friend states that at the meeting of railway surgeons most of the papers were upon "surgical subjects," I hope all will declare the analogy complete.

We certainly all realize that "the mills will never grind with the waters that have past;" so we must utilize the present, and we vie with each other as to who can best work and best do. So specialties in every department of science vie with each other, and I claim that if the specialist is not more successful in his own special sphere than the man who spreads over the entire domain of his profession, then the specialist is a failure and his presence is not needed or desired; but, on the other hand, if he is and can be of more service, then he is needed, and the demand legitimatizes his presence. And if there be not a demand he rises and falls like a bubble on the water, passing back into the mass unseen and unfelt.

I concede that history has not yet recorded railway surgery as a permanent branch of the science and art of surgery, but time only is needed for such record I feel assured. The claim to such recognition has been made, and the leaders of this great congress will have said to the world, "we recognize railway surgery," and upon the records of this congress railway surgery has its floor and these records pass into history bearing the tidings of the now living, not dead, and we can assure you that 6,000 surgeons in the United States alone stand ready to prove the wisdom of your action. History tells us that in Boerhaave's day he undertook to state in one sentence all that was known of medicine, and need I refer to the medical section of this great congress to verify the great progress made since? Certainly no one would claim for railway surgery more than a branch of the great surgical tree that has grown and developed from an insignificant beginning in the tiny twig, which to-day stands the giant oak, with railway surgery as one of its topmost branches, drawing strength and knowledge from the parent stem. As that master of American surgery, Samuel D. Gross,

used so often to say, "'twas indeed an ignorant son who could not teach his father something." So may we once more verify the truthfulness of the adage and prove a help to that science and art to which we all so devoutly cling, and work to add our mite to the beauty and grandeur of the whole.

Shock, which plays so important a part in all injuries, should receive special attention from the railway surgeon, for, as has been so aptly and plainly shown by the chief surgeon of the Missouri Pacific Railway, that other conditions aside from force conduce to the production of profound shock and chief among those conditions is enumerated the fact that the patient has added often to the physical injury a nervous, or possibly more correctly speaking, a mental shock, and this latter form of shock finds its highest form of expression in an accident where the injured, through the sense of sight, was conscious for some moments at least of the approaching danger. This might most appropriately be illustrated by the brakeman with the foot caught in the frog of the rail while making a flying switch, totally unable to extricate himself, the car detached from the engine and under good speed, rendering escape impossible; so that the mental condition adds most markedly to the fatality of the injury. I say, adds most markedly to the fatality of the injury, because experience has proven that injuries occurring at night, when the injured has not been able to fully comprehend by the use of all the senses that can be brought to bear, have been less fatal and accompanied by a far less serious state of shock. And I am convinced that a day-light accident adds greatly to the horrors as well as to the fatalities. However new and unworthy this idea may seem to some, it is and has been recognized by many railway surgeons of extended experience for years, and so firmly am I convinced of this being a fact that I confidently expect the entire profession to recognize it just so soon as experience in railway work will admit of more extended conclusions, and I feel that even military surgery rarely presents such mental strain, for there is a hope with the soldier that "another, not I," will suffer.

There is a question in connection with railway surgery that I feel that this section should discuss at this time, that the question may not only be settled, but that the members of this section may be relieved from the humiliating and untrue reflection often cast at them for a want of proper understanding or a proper conscience of the subject by their professional associates. I blushingly refer to the criticism often hurled at our members by those rash and unbalanced, if not unposted men, who accuse the railway surgeon of unfairness and a lack of equity in his dealings with his patients—the company's injured. My experience has been that no railroad company with which I am at all familiar desires anything but the truth, and only fears deceit and falsehood, and of all other employes they fear deceit and falsehood most in the medical and legal departments, and, feeling that they have in their employ a doctor whose character can be impeached, can not soon enough discontinue his services.

The general manager's idiosyncrasies must of necessity pervade every department of the service, but the vast majority of general managers are certainly grand, quick, and perceptive men, receiving advice from a well-balanced legal adviser, who rarely fails to separate the true professional man from the quack, whether in or out of the professional pale. That we can not all think alike is as true as that we can not all feel alike, and in these differences we find our safety, for intolerance is bred of force and strength, and unity is said to bring strength and force not always tempered with equity and justice. That the doctor has been accused of invading the claims department in isolated cases, I grant you, and that he is not a member of the claims committee I wish to impress you. That time, if it ever existed, has long since passed.

Lord Chief Justice Coleridge said from the English bench, only last February, in a railway case, referring to the action of a railway surgeon who had been acting for his company in endeavoring to compromise a claim with the injured man, to whom he had submitted various offers for settlement, viz: "Anything more improper

than what was done by the company's medical officer—I mean making offers of various sums to the plaintiff—I never heard. I thought all great railroads had given up the practice. Medical men huckstering with the parties injured as to the amount of damages;" and on this ground a new trial was refused, after a verdict of $4,250 had been awarded. I only copy this case to show how impractical it would be for a company, however much inclined to use a doctor for such a purpose, even if the the doctor could be found who would consent to such a service. And we know and see quite plainly only harm could come to all interested in such practices; and the astuteness of the solicitors for all railroad companies would most effectively stop such practices, even if it were possible to use any doctor for such a purpose. The mission of the railway surgeon can hardly be misunderstood. Clothed with skill, he yet must be philanthropic; without either, or with but one of the attributes, he can not be a success. His place in the service is as distinct and separate from all the rest as is the station agent's distinct from the general managers. He merges not into the legal or claims department, or any other, and is asked by the company only for the truth and the truth only. Indeed, one of the most accomplished railway surgeons I know said to me less than a month ago that the mammoth system for whom he occasionally did local and general work had made it a point to let all know that they wanted only the facts, in or out of court. I hope I may be pardoned for this digression at this time, and I feel that I may be pardoned if not justified in alluding to this phase of the railray surgeon's duty. I know of no science the execution of which should be accompanied by more philanthropy than the science of medicine, and I know of no branch of that science which calls for more philanthropy than railway surgery.

In conclusion, I presume to say that we are all working in whatever field, for the same ultimate end, viz., perfection—improving every avenue, elevating every part that the whole may be elevated; not seeking to weaken, but to strengthen; and is it not the duty of every man to recognize him who can "best work and best do" in his own special sphere, however limited that sphere? I feel that no specialist could consent to be barred from the grand central fountain of knowledge, grading down to his own limited sphere, which must to all appear insignificant as compared to the whole. So we hope and believe that the great growing science and art of medicine and surgery can but be aided and strengthened by the specially adapted and qualified railway surgeon, whose greatest and grandest field of labor lies in the direction of offering aid and relief, both scientifically and philanthropically, to that portion of humanity whose environment extends to the iron horse, with all the catastrophies incident to so hazardous an industry, giving rise to special forms and conditions of injuries and requiring specially experienced surgeons in their care and attention, that the best results may be obtained for all.

SECTION VII.—OBSTETRICS.

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Dr. James Peter Boyd, Albany, N. Y.
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Dr. Matthew D. Mann, Buffalo, N. Y.
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Dr. Rudolph Matas, New Orleans, La.
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Dr. Theophilus Parvin, Philadelphia, Pa.
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Dr. Giles S. Mitchell, 277 West Eighth street, Cincinnati, Ohio.

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Dr. Fernando Zórraga (Arco de San Augustin 12), City of Mexico, Mexico.
Dr. Velasquez, Managua, Nicaragua.
Dr. Isabelino Bosch (18 de Julio 299), Montevideo, Uruguay.
Dr. Angel Rivas Baldwin, Caracas, Venezuela.

ADDRESS BY GILES S. MITCHELL, A. M., M. D., President of the Section.

Members of the Obstetrical Section: History, with its eras and epochs, its revolutions, changes, and struggles, is the record of the events to which the opinions, the interests, and actions of men have given birth. It is the interior of man's life, revealed in things that belong to time and this world. Our present coming together marks an important era in medicine. The assembling together of so many

distinguished physicians, illustrious in their own countries, all members of the republic of science, which embraces all countries, can only result in the further advancement of our science and perfection of our art.

Parturition in different races, in different countries, can not so widely differ; hence the means and methods of aiding it should not be so varied. I am convinced that a meeting such as we are inaugurating to-day will be more potent in diffusing a more just and mutual appreciation of our knowledge and practice than volumes of literature; beneficial results that will be felt throughout the great republic of science. A book speaks only one language, but a society such as the Pan-American speaks all languages.

I am well aware that our science is progressive and unfinished; that the doctrine of to-day is not the doctrine of to-morrow; and to-morrow it is still less likely to be dominant, and that the last words on any medical subject will not be uttered in our time. Notwithstanding all this, however, we are here for the purpose of expressing collective judgment upon controverted points in our special department. Certain great principles have been grasped which seem unlikely to undergo change, but the mode of application of those principles is susceptible of infinite improvement, and each step in advance means the saving, probably, of many lives.

"Medicine," says Lord Bacon, "has been a science more professed than labored, yet more labored than advanced; the labor having been, in my judgment, rather in a circle than in progression. For I find much iteration, but small addition." Especially was this true of obstetrics until the last two decades, since which time the progress has been extraordinary, and the advancement is as gratifying as it is startling. In 1847 Semmelweiss clearly indicated the true nature of puerpural infection and pointed out the way to guard against it, but his voice was not heeded until after Lister had utilized the researches of Pasteur and became the father of antiseptic surgery. During all of this time Tarnier was struggling to benefit obstetric science by the employment of antiseptics in labor, but his efforts were not appreciated until Stadtfeldt, of Copenhagen, employed them on an extensive scale in hospital practice. This marked the dawn of antiseptic midwifery and paved the way for aseptic obstetrics.

The enthusiasm with which the German school embraced the antiseptic plan soon led to abuses that were followed by serious consequences. At this time (1879) carbolic acid was the antiseptic most frequently exhibited, and during that year many deaths were reported, traceable directly to its employment. Influenced by the gratifying results obtained by antiseptic methods in surgery, Schroeder, Winckel, Breisky, and Gusserow inaugurated the present aseptic or prophylactic plan. They believed infection comes from without and is best guarded against by preventing the introduction of poisonous matter; hence they made their attack upon the possible carriers of germs—the obstetrician himself, his instruments, and his attendants. The dangers arising from the too free use of carbolic acid, its disagreeable odor, and the large quantity necessary, were important factors in causing it to be supplanted by the bichloride of mercury, the antiseptic recommended by Tarnier in 1881 and the germicide most likely to be popular for years to come.

The obstetric forceps was originally given to the profession by the French school and it seems but natural that its present perfection in the axis traction instrument should be the result of the genius of Tarnier, the most famous accoucheur in France to-day. By this instrument it is possible to terminate safely both to mother and child labors which formerly could only be relieved by craniotomy, symphyseotomy, or Cæsarean section.

In spite of asepsis and antisepsis in obstetric practice, the Cæsarian operation continued to be an almost necessarily fatal operation until within the last decade. It seemed to matter little who the operator was or the condition of the patient operated upon, the result was the same. Barnes, in the last edition of his work on obstetric operations, published in 1886, in speaking of it, says it is conservative in its design and in its ambition, but it is too often sacrificial in fact. It is resorted to

with a feeling akin to despair for the fate of the mother, which is scarcely tempered with the hope of rescuing the child. It is looked upon by the great majority of obstetricians as the last desperate resource, as the most forcible example of that kind of surgery which John Hunter regarded as the reproach of surgeons, being a confession that their art was baffled. Pajot, in his preface to the French edition of the same author's work on Diseases of Women, published in 1875, affirms that Cæsarian section has cost the lives of all the unhappy, ignorant women who have undergone it in Paris since the beginning of this century; and, he adds, it is still practiced. During the last ten years, chiefly through the efforts of Leopold and Sanger in Germany, Murdoch Cameron of Glasgow, and our own distinguished citizen, Dr. Robert P. Harris, of Philadelphia, the technique of the operation has been so modified and improved that it has become a safe operation. The maternal mortality in skillful hands is not above 6 per cent and the infantile mortality not more than 3 or 4 per cent. Porro, of Pavia, in 1876, in view of the frightful mortality attending Cæsarian section, devised and successfully performed the operation that bears his name, *i. e.*, the removal of the uterus and appendages by amputation through the cervix, after extraction of the child.

The success attending this operation was so gratifying that it was approved and adopted by twenty different countries in fifteen years, displacing almost entirely the classic Cæsarian. Its advocates claim for it that it gives greater security against hæmorrhage; there is no uterine wound to heal, there is less risk of septicæmia, and there is security against further pregnancy. Symphyseotomy, an operation recommended by Segault in 1768 and recently revived and performed with great success by Novi, Martini, and Morisani, of Naples, was so little thought of by American obstetricians that one of our most eminent authors, in the last edition of his book on midwifery, 1890, uses the following language: "American obstetricians will find no conditions justifying its performance." In a recent article in the Philadelphia News, by Robert P. Harris, he makes the statement that for one hundred and fifteen years after its introduction by Segault no one ever ventured to perform it in our Western Hemisphere; and it was not until the evidences were so startling and beyond dispute that the initial step was taken in Brooklyn, on the 30th day of September, 1892, by Prof. Charles Jewett. During the past two years, however, the results following symphyseotomy have been so brilliant that in many countries it has supplanted the Cæsarean and the Porro-Cæsarean operation. I mention this to illustrate the rapid strides that have been made in obstetric surgery during the last lustrum, not to anticipate in any way the papers which will be read on these subjects during the session by eminent gentlemen from different parts of the Western World.

The employment of anæsthetics for the relief of pain in normal labor, long practiced in the United States, has in recent years become almost universal. The time has arrived when the lives of both mother and child can be saved. We now recognize that "an infant come to maturity is destined for something more important than to have its glimmering life extinguished by an accoucheur skilled in the use of a murderous perforator." Craniotomy, that revolting, murderous operation, has probably been performed for the last time on a living child. Puerperal fever, which twenty years ago hovered like a plague over the lying-in wards of great charities and menaced the lives of so many women in private practice, has almost entirely disappeared. By antiseptic treatment of the nipples, and by compression in cases of threatened mastitis, all symptoms vanish and the abscess is averted. Since the antiseptic treatment of the umbilical wound, tetanus neonatorum is rarely seen. Ophthalmia neonatorum, so destructive and so frequently met with formerly, has, by the instillation into the eye of one drop of a 1 to 50 solution of nitrate of silver, been eradicated. It would seem that we had almost reached the *ultima thule* in our special department; that the obstetrical millennium was at hand. While this is in a great measure true, there are many evils yet to correct. While the mortality in lying-in hospitals has been so reduced that it has almost reached the vanishing point, and this in spite of the large number of abnormal and operative cases which necessarily find their way there, the results in private practice in normal cases have not been nearly so favorable. The cause of this is plain. It is due to the nonobservance of prophylaxis and necessary antiseptic precautions. The dangers of the hospital are recognized and antagonized, but those which abide in the homes of ease and luxury are not so apparent, and in consequence are frequently overlooked. We should insist upon it that the same scrupulous care and cleanliness be exercised

in the private residence as obtains in the public charity. When this is accomplished then will we have true prophylaxis in private practice, and the high rate of mortality which is now observed in normal labors will no longer obtain. The consensus of opinion of the obstetrical section of this Congress ought to go very far in settling questions such as: How much pressure and molding can the fœtal head be subjected to without permanent damage? When is delivery by turning preferable to the forceps? The limitations and field of symphyseotomy, Cæsarian section, Porro-Cæsarian, and the induction of premature labor. All of these operations are recognized as safe and proper surgical procedures. Each has its ardent admirers and loyal supporters, and each one has a field within whose limits the other operations are neither so safe nor so desirable. Symphyseotomy is an operation requiring less skill and surgical knowledge than celio-hysterotomy or celio-hysterectomy, and its range is a wide one; but even its most enthusiastic advocates will hardly claim that in every instance it is a substitute for the improved Cæsarian or the Porro operation. There are cases in which the dystocia, either due to a rachitic pelvis or a tumor, or to both, is so great that pubiotomy would not enable the accoucheur to deliver a viable child. All cases can be treated with the promise of success by the Cæsarian method, but it is a more perilous operation than symphyseotomy. Pelvimetry has been so thoroughly taught and insisted upon in recent times and the pelvimeter so perfected that even the average obstetrician can estimate with comparative accuracy pelvic diameters, and it is now possible to give approximately definite measurements to be governed by. I believe it is now the rule with obstetricians who have had the largest experience and been the most careful observers, that while it is possible to deliver by version or means of the forceps with safety to the mother, where the conjugate diameter is not more than 3 inches, yet it is usually disastrous to the child. Therefore, in cases of flat pelves, symphyseotomy is a safe and preferable operation when the conjugate diameter is not greater than $3\frac{5}{8}$ inches nor below $2\frac{3}{4}$ inches. When it is below this the improved Cæsarian is indicated, unless there is a septic uterus or a large fibroid complicating labor; in such cases the Porro operation ought to be selected.

The induction of premature labor has strong advocates and much to recommend it to popular favor, but in view of the high infantile mortality following it, the more advanced obstetricians will hesitate to employ it. Winckel states that of children born at from seven and one-half to eight months, only 33 per cent are kept alive. At the Leipzig Maternity, where the incubator is most thoroughly used, there is an infant mortality of 18 per cent and at the Paris Maternité 30 per cent. It is also well known that the mortality of premature infants, even among the better classes, is very high during the first year of infantile life. The maternal mortality following the induction of premature labor is estimated at from 5 to 6 per cent; an estimate entirely too high in skillful hands. Recent statistics show a maternal mortality of 1 per cent or less in symphyseotomy, and the chances for a mature, fully developed child delivered by this procedure to arrive at its majority are far better than are those of the infant born six weeks or two months before its time. Extra-uterine pregnancy, one of nature's most fatal blunders, is much more frequently diagnosed than formerly, and in consequence a laparatomy saves most of the unfortunate victims. Marked improvement is also to be observed during the last decade in the treatment of abortion, eclampsia, post-partem, and accidental hæmorrhage. Even if time would permit, it would not be right and proper in an inaugural address which is not the subject of open discussion to dwell at length on any one subject in our department or to make dogmatic statements.

This section of the Congress, I trust, will be eminently a teaching section, offering opportunities for that correction and verification of experience which is so valuable to those whose experience is limited, upholding what is right, and exercising a wholesome influence on all obstetric surgeons. The dispelling of ignorance means the saving of life; having that end in view, we can hardly fail to do what is right and what is best.

In conclusion, permit me personally to extend to Dr. Hugh Hamilton and Dr. John J. Castellanos, the English and Spanish speaking secretaries of the obstetrical section, my sincere thanks. Through their untiring efforts our programme embraces forty papers, all upon topics of the greatest importance and keenest interest in our department. The programme is indeed brilliant, and replete with the names of obstetric surgeons whose fame is international. I anticipate for our section scientific work of the highest possible character.

Thanking you for your patience and courtesy, I now declare the obstetrical section of the first Pan-American Medical Congress open for the transaction of business.

PAPERS READ BEFORE THE SECTION.

HÆMORRHAGES OF PREGNANCY; THEIR MANAGEMENT.

By JOHN O. POLAK, M. D.,

Instructor in Clinical Obstetrics in the New York Post-Graduate Medical School and Hospital, and the Long Island College Hospital, Brooklyn.

The time allotted me for this paper is so limited that I will only speak of the more important hæmorrhages: bleeding as a symptom of miscarriage, placenta prævia, and the partial separation of a normally placed placenta, occurring antepartum; while under post-partum bleeding I will consider hæmorrhages from uterine atonicity, from lacerations in the cervix, vagina and vulva, and finally, secondary uterine hæmorrhage, leaving rupture of the uterus and ectopic gestation to the consideration of others of a wider experience.

Hæmorrhage as a sign of miscarriage, when very slight, may be controlled by rest in bed, elevation of the hips, with the initial use of morphia per rectum, followed by 1-dram doses of the fluid extract of viburnum, or the 4-grain pill of the solid extract. Though I admit the value of opium and the bromides in these cases, and their almost universal use, I must urge the efficacy of viburnum as a uterine sedative. If time would permit, I should be pleased to report in detail the histories of 32 cases of threatened abortion treated by rest, initial suppository of opium, and fluid extract of viburnum prunifolium, no case resulting in miscarriage. In the more severe cases, with abortion inevitable, cervical softening, dilatation, and ovum separated, perhaps protruding, everything being aseptic, the cervical and vaginal tampon is to be advocated. Method: After emptying bladder and rectum, patient in Sims's position, douche with an antiseptic solution, as creolin 2 per cent; then through a Sims's speculum, with anterior lip of the cervix fixed, carry strips of iodoform gauze into the cervical canal through the internal os, making a firm intra-cervical plug; then pack anteriorly, posteriorly, laterally, and finally against the cervix, filling the whole vagina with gauze. The importance of the intra-cervical plug is threefold: (1) it stimulates uterine contractions by its presence; (2) it hastens dilatation; (3) it completes the separation of the ovum by causing the blood to accumulate between the womb and fœtal membranes. When the hæmorrhage is profuse, sepsis imminent, or the patient suffering from acute anæmia, thorough evacuation with the aseptic finger or curette is the procedure. If the uterus be septic, irrigate the cavity with one-third strength solution of peroxide of hydrogen, and subsequently pack with iodoform gauze, after leaving from 30 to 60 grains of iodoform within the cavity. There is no difference of opinion as to the necessity of controlling the bleeding in cases of inevitable abortion, and it is generally agreed that the tampon is the method par excellence, leaving it in position from six to twelve hours.

Its removal will be followed by the ovum or fœtus in the majority of cases, and the immediate symptoms will subside; yet the uterus may not be completely emptied, especially in the early months portions of the secundies will be retained, later portions of the placenta. In these cases, shall we pursue the expectant plan, waiting for subsequent hæmmorrhage or ptomaïne absorption before interfering, or advise radical interference? Notwithstanding the views of such men as Tarnier and Parvin, I believe better results will be gained and many deaths from sepsis be averted by the curette, irrigation, and drainage with iodoform gauze. If possible, it is safer to use the aseptic finger than either the sharp or dull curette. Ergot should not be given until the womb has been relieved of its contents. I want to add to the record of Durhssen, who reports 150 cases with no deaths attributable to the treatment, 27 cases during the last two years, with no deaths and perfect recovery; the patients subsequently having neither suffered from hæmorrhage nor endometritis, which are such frequent sequels to improperly managed miscarriages.

Placenta prævia.—Clinically a placenta is prævia when it has an attachment in the lower zone and the cervix from which it is detached during canalization, or, as Rigby describes it in his essay more than one hundred years ago, "A prævia is fixed to that part of the womb which always dilates as labor advances." The hæmorrhage is primarily from the ruptured uterine sinuses exposed as the placenta is separated; secondarily, from the placenta itself. Clinically we may classify the varieties of placenta prævia as total, lateral, and marginal.

The treatment is best considered under three heads: (1) Before viability; (2) after viability; and, (3) the management of labor.

Before viability.—Diagnosis made with the fœtus dead, total prævia, or copious hæmorrhage, empty the uterus; none of these conditions being present, wait.

After viability.—Act with the occurrence of the first hæmorrhage; for not only is it proven by statistics and clinical observation that the mortality in these cases is greatly reduced by induction of premature labor, but it is not right to leave the patient to the chances of a fatal result from hæmorrhage, nor allow her strength to become exhausted by repeated or continued bleedings, not to speak of the nervous strain she sustains. Murphy and Barnes advocate separation of the placenta within reach by insinuating the finger through the os between placenta and uterine wall, and sweeping it about, thus detaching the placenta from the walls of the womb as high up as the finger can reach; then put in a Barnes bag and wait. The bleeding will not continue with dilation if the placenta has been sufficiently separated at first. They proceed in this manner until the os is fully dilated, then decide which is the preferable course to pursue—forceps, version, or to leave it to nature. Murphy gave ergot freely to start up pains. This I do not believe to be safe practice.

If the cervix be closed, douche; then tampon with iodoform gauze, taking special care to introduce strips in through the cervical canal. Remove after four or five hours, keeping the patient under close observation, and the cervix in most cases will admit one or two fingers. There is now ample dilatation to perform version by the Braxton-Hicks method, bring down a foot, which acts as a most efficient tampon, and by drawing it through the os perfect control of the hæmorrhage may be had. Then leave the case to nature as far as possible. And let me urge in this connection separating in all cases when possible the two operations of version and extraction. The advantages of podalic version by the Braxton-Hicks method are: (1) it is possible to turn when the os will only admit one finger; (2) by early rupture of the membranes further separation of placenta is prevented; and (3) the breech acts as an aseptic natural tampon controlling hæmorrhages.

In my last two cases, hæmorrhage occurring at the end of the eighth month, considering the fœtal mortality, and the desire of the mother to bear living children, I resorted to bipolar version, Durhssen's incisions, extraction, manual delivery of placenta, and the intra-uterine tamponade with good success. It must be borne in mind when the incisions are used that the portio-vaginalis must be effaced, and we should be prepared to repair the cervix at once to control hæmorrhage. When labor occurs spontaneously, tampon to control hæmorrhage and promote dilatation, turn, and extract; forceps may be used if the head is engaged.

Digital dilatation, podalic version, and extraction have proved successful in the hands of many. The incisions are quicker if the cervix be effaced. In total prævia

Zweifel suggests to avoid perforating the placenta, as recommended by Wigand, but to carry the fingers over the edge anteriorly, thus reducing fœtal mortality, though less hæmorrhage is caused by perforation. In head presentation, prævia lateral or marginal, pains good, strong, and regular, there being no disproportion between the head and pelvis, rupture the membranes, apply a binder, and wait; deliver by nature or forceps.

Accidental hæmorrhage from partial separation of a normally placed placenta.

Varieties.—Concealed and apparent.

Management.—If the os uteri be sufficiently dilated to admit of delivery either with forceps or podalic version, one or the other is to be employed. If undilated, digital dilatation, the Barnes bag, or, if the portio-vaginalis be effaced, the bloody method must be employed; then rupture the membranes and deliver by either forceps or version. Remove the placenta immediately and tampon the uterus with iodoform gauze to prevent further hæmorrhage. Lower the head, give stimulants hypodermatically, and saline infusion between the scapulæ. To combat the acute anæmia, craniotomy may be resorted to if the fœtus be dead or non-viable. I condemn ergot in these cases before delivery as causing spasmodic action and a tendency to the formation of stricture at the lower segment.

Post-partum hæmorrhage from uterine atonicity.—There have been innumerable suggestions as to the management of this accident, yet I will simply outline the methods which have been of most service to me, mentioning them in their order of application: (1) Proper management of the third stage, waiting a full half hour before delivering if there be no hæmorrhage; grasp the fundus and keep up continuous friction until retraction is firm. If bleeding occurs, express the placenta at once, or remove it manually. After expressing the placenta, squeeze out the clots and press the fundus well into the iliac fossæ. A full bladder after labor has caused hæmorrhage from atonicity in my experience. (2) Ergot hypodermically. (3) Hot douche, with the hand in the uterus, raking down the walls. (4) The intra-uterine tamponade, which acts as an irritant, stimulating contractions, and by so doing plugs the open sinuses.

Cervical hæmorrhage from laceration may be controlled by the aseptic suture or the uterine and vaginal tampon, taking care to plug the lacerations.

Suture ligatures will control the bleeding from tears in the vagina and perineum. Combat the acute anæmia consequent upon flooding by lowering the head, stimulants, as ether, whisky, ammonia, etc., hypodermically; auto-transfusion and subcutaneous injections into the loose cellular tissues and rectal enemata of 0.6 per cent salt solution at 100°F.

℞ Sodii Carb., gr xv; Sodii chlor. ʒiss; Aquæ, Oii. Apparatus.

In conclusion let me very briefly call your attention to secondary hæmorrhage occurring one or more days after labor and mainly due to the following causes: Retention of fragments of placenta, membranes, a placenta succenturiata, blood clots especially in multiparæ and full bladder.

Treatment.—Empty uterus of blood clots with the fingers, etc., douche, tampon, and give ergot.

A STUDY OF PLACENTA PRÆVIA; ESPECIALLY THE CAUSES OF HÆMORRHAGE.

By SARAH HACKETT STEVENSON, M. D., Chicago, Ill.

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The causes assigned for the hæmorrhages in placenta prævia have seemed to me inadequate, as I have attempted to explain the subject to my classes. For the past ten years I have been teaching a theory or theories that have not as yet found their way into text-books, nor, so far as I know, have they appeared in current literature,

save in one instance. There is a partial explanation made in a paper* which I found after this paper was finished, and to which I shall refer hereafter.

The point upon which all must agree is that the relation between the placenta and the uterus is disturbed, that the so-called utero-placental vessels are ruptured, and blood escapes. But all are not agreed as to the factors that enter into the disturbance of the utero-placental relation, nor is there agreement concerning the source of the hæmorrhage.

One of the oldest theories is that the cervix forms the part of the uterine cavity; that the internal os is so obliterated by expansion as to leave nothing between the presenting part and the vaginal cavity save the external os. Necessarily, then, if the placenta were fixed upon or beside the internal os, it would be subjected to this continual shifting of its foundation, and hæmorrhage would naturally follow.

According to the latest teaching this obliteration of the cervical canal does not occur.

It is undoubtedly true that in the majority of cases the cervix retains its integrity as a cervix until parturition begins, but it is equally true that in a considerable number of cases the cervix forms a part of the general uterine cavity long before labor. It is not possible that all cases of placenta prævia occur in those uteri whose cervical canals are obliterated, as clinical experience demonstrates over and over again. Therefore that theory is not equal to the explanation of all cases. Especially it can not explain the early hæmorrhages, those which occur before canalization of the cervix has begun.

The theory that the uterus grows away from the placenta is supported by high authority. Jacquemir is given credit for this theory, and it is accepted by Cazeau, Auvard, and others. It is affirmed that the physiological hypertrophy of the uterus does not occur simultaneously in the upper and lower segments; that the superior segment or zone is developed during the first six months and the inferior during the last three, after the placenta has attained its growth.

That the uterus increases in size during the last three months is indisputable. It is likewise true that this is a real increase and not a mere stretching of the walls to accommodate the growing fœtus. One can not believe, however, that this increase of the last three months is due entirely to the development of the lower segment. If the placenta stops growing after the sixth month and the upper segment continues to increase, there would then be cause for hæmorrhage in the normal as in the vicious implantation, for surely the uterine tissues at the placental site do not cease while the tissues all around continue to develop.

It is possible that this lack of parallelism between the development of the placenta and the uterine tissue, if it exists, may be one of the causes of hæmorrhage that sometimes occur in normal implantation.

The lower or non-contractile zone of the uterus is non-contractile on account of the paucity of muscular fiber in that zone, but we have no positive evidence that the muscular fibers, though comparatively few, do not take on development with the beginning of pregnancy. Indeed, the development of the cervical tissues is one of the very first signs of pregnancy, and one can not understand why the fibers of the lower uterine zone should be omitted from the general development. At all events, this theory, if true, does not explain the hæmorrhages that occur during the first six months.

Legroux, quoted by Auvard,† holds dire tly the contrary view from Jaquemir. So that whether the uterus grows away from the placenta or the placenta from the uterus is still in question. When one takes into consideration the power of adaptability of the placenta in abdominal, ovarian, and interstitial gestation, the lack of parallelism in development loses force as an argument. Even tubular gestation goes on in perfect adaptation until the limit of the development of the tube is reached. Why the lower uterine segment should not respond to the physiological demand is certainly without a parallel in other abnormal situations.

According to my own observation the lower segment does respond to the very utmost, and therein lies the danger. This is really the key to the question. This extra vascular development of the lower uterine segment is dangerous, for two reasons: First, the course of the uterine arteries and veins; second, the law of gravity; or rather, these two first might be considered under the one head of gravity, and a second reason found in the lumen of the parturient basin.

Given gravity and a tube open at the bottom, everything solid or liquid that occupies or impinges upon the lumen of that tube must sooner or later be expelled; especially must this be true of liquids.

First, there is the general law of gravity acting more or less upon all the vessels and even organs below the diaphragm. This is so well known and understood

* Theory of Hydrostatic Pressure in Early Hæmorrhage of Placenta Prævia. By Maximilian Herzog. Cincinnati Lancet Clinic, April 25, 1891.

† Traite Pratique d'Accouchment.

that there is need for special study concerning the diseases and dangers of the upright position in man, as pointed out by Clevenger.

It goes without saying that if the pregnant woman occupied the position of quadrupeds many of the complications of pregnancy would never occur, or they would be favorably modified if occurring.

As to the action of the uterine arteries and veins, one has but to glance at their general course to and through the uterus to see how they contribute to the difficulty. The uterine artery enters the uterus near the neck and, pursuing a very tortuous course, passes upward to join a branch of the ovarian. The arterial blood reaches the normal placental site by an indirect, tortuous route, against gravity; whereas the arterial supply to the prævia is almost straight from the internal iliac, and a hæmorrhage from that zone is almost like tapping the aorta. Rigby, quoted by Hirst,* reports a fatal case of hæmorrhage in which the separation of the placenta was no larger than a crown piece. The new arteries formed to supply the placenta in the lower uterine zone are too directly connected with the main branch for safety. The general direction of the uterine arteries is across the body of the uterus, while the general direction of the veins is longitudinal. This is the best possible arrangement when the placenta is near the fundus, as we shall see further on.

There is no necessity for far-fetched theories; the question is one of mechanics purely. We see what havoc the so-called intra-abdominal pressure makes in driving down and out the uterine, vesical, and rectal zones. These phenomena, analyzed, mean gravity and the pelvic outlet. We have in these displacements nearly all the mechanics of parturition carried on, minus uterine contractions. The uterus, the bladder, and the rectum correspond to the fœtal body, and expulsion is brought about by gravity acting through an open channel. All the supports from above weaken and gradually yield to the one constant force, viz, pressure from above—weight or gravity—whichever name it may be given. To this situation in pregnancy we must add the special uterine contractions which begin at the fundus, even in the first weeks of pregnancy, and proceed downward toward the cervix, and which at their maximum intensity have been estimated to exert a force all the way from 25 to 500 pounds. Consider also the so-called intra-uterine or hydrostatic pressure so ably described by Maximillian Herzog.† This pressure of the amniotic sac upon the fœtal face of the placenta is described by Poullet‡ as equal to 8 centimeters of mercury. Why the placenta in its normal place is not disturbed by this pressure is because the uterine wall offers a counter pressure, while the opening os-uteri offers no such resistance. Consider the fragile condition of the coats of newly formed vessels, the uterine placental sinuses having only the single coat of epithelium; and according to M. Coste the filaments of the placental villi are so frail as to tear open from pressure of the finger.

Winckel states in his last edition that it is hard to tell what produces the lesion of the utero-placental vessels in the early months of pregnancy when dilatation of the cervix is out of the question. To my mind, it is much harder to state why the lesion does not occur; one can scarcely see what there is to prevent it. It is true that the blood vessels are a system of closed tubes, but it is equally true that the most dependent portion of the uterine contents is the newly formed vascular tissue filled with an excess of blood, owing to the general law of gravity and to the particular distribution of the vessels favorable to the prevention of hæmorrhagæ when the placenta is high, and the reverse when the placenta is low. The mechanism of parturition acts upon the contents of these dependent vessels as upon the fœtal head, and whenever the expelling force—be it uterine contraction, intra-uterine pressure, or any or all the factors of expulsion—whenever this force becomes stronger than the resistance of the utero-placental membrane or wall, then that must yield and the contents escape. Uterine contractions are expected to be strong enough to rupture the bag of waters; then why wonder that even weak uterine contractions should rupture newly formed blood vessels that occupy the most dependent position in the parturient canal?

In connection with this subject, it is well to understand, as far as possible, just what takes place during a contraction when the implantation is normal. In the first place, there must be a greater or lesser stasis of blood both in the uterine wall and in the placenta. The blood, for the time being, may be said to be squeezed out of both; but where does this blood go?

Hirst§ refers to Barbour's experiments, whereby it was ascertained that the placenta is able to diminish one-half of its area. Hirst thinks the placenta follows the uterine wall until the villi touch each other. Some provision must be made for the blood during the contractions.

It is my opinion, from the study of the direction of the vessels, that in the normal situation the blood from the contractile region of the uterine muscle is squeezed

* Am. System of Obstetrics.
† *Loc. cit.*
‡ Dict. Encyclopedie des Sci. Medicale.
§ Am. System of Obstet, p., 629.

into the veins of the lower uterine segment; the veins have a general longitudinal direction and run from below upward, which makes them all the more capable of receiving the blood that is pushed along by the contraction. When the placenta is prævia the contractions still begin at the fundus, and the blood from above is pushed into the already overdistended vessels of the lower uterine segment. It is no wonder these veins are ruptured at their weakest point, viz, the utero-placental portion. The very fact that there are so few muscle fibers in the lower uterine zone leaves abundant room for the veins to carry off the blood from the upper portion.

If the entire uterine wall contracted with the force of the upper portion, it is hard to conceive of the disposition of the blood. In fact, the lower uterine zone, down to the entrance of the main venous trunk, may be looked upon as a diverticulum for the venous blood of the upper zone. Thus does the lower relieve the upper segment.

It is well also to consider the distribution of the placental blood during a contraction. Delore * describes two diverticula into which the blood is pressed during the contractions; the first is just below the fœtal face of the placenta, the second between the folds of the allentoid-chorion wall. It is plain to see how these diverticula can be utilized in a normally situated placenta, but in the condition of prævia the blood must be pushed upward not only against gravity, but against the intra-uterine pressure. It is impossible to see how these spaces can be utilized for the retention of the placental blood during uterine contraction. Instead of the blood toward the fœtal side of the sinuses being sent further toward the fœtus, it would receive an impulse in a contrary direction. Thus are all the safeguards against hæmorrhage subverted and transformed into sources of hæmorrhage. As to the source of the hæmorrhage, both Simpson and Hamilton taught that the chief source was the placenta. Hirst † closes his discussion of the subject, saying: "It is hardly necessary to state that the bleeding is not from the placenta, but from the uterus."

The facts are, there is no reason why the hæmorrhage is not from both sources. The placental vessels are frequently found full of thrombi, and Winckle ‡ describes a hematoma of the cord the size of an egg. As a rule, the fœtus does not bleed to death, but the reason for it is not that there is no bleeding from the placenta, but rather from the fact that thrombi are so easily formed in the placental vessels. Evidences of arrested placental hæmorrhages are found over and over again in the normal implantation. As a matter of course, the hæmorrhages dangerous to the mother are from the uterine vessels.

In conclusion, there is no necessity for calling to our aid the theory of lack of parallelism between the development of the uterus and placenta, or the early canalization of the cervix. The situation of the placenta at the outlet of the parturient canal, the distribution of the uterine arteries and veins, and the ever-acting expulsive forces are sufficient in themselves. The other factors, if they occur, add so much more to the difficulty, but they are not constant, and therefore should not be set forth as the main reasons for hæmorrhage. Just as surely as water runs down hill will there be hæmorrhage in placenta prævia, the blood in the utero-placental sinuses obeying the well known law of motion in the direction of least resistance.

A METHOD OF PERFORMING RAPID MANUAL DILATATION OF THE OS UTERI AND ITS ADVANTAGE IN THE TREATMENT OF PLACENTA PRÆVIA.

By PHILANDER A. HARRIS, M. D., Paterson, N. J.

GENTLEMEN: I wish to first engage your attention with the description of a manual method of effecting rapid and very extensive dilatation of the os uteri for parturient purposes. So far as I am aware, the method I shall endeavor to illustrate has not been described or practiced by others. I have asked a number of professional

* Dict. Encyclopedie des Sci. Medicale. † Am. Syst. of Obstet., p. 52.

‡ Text Book of Obstetrics, p. 18.

friends to explain or exemplify their conception of manual dilatation of the os in parturition. From none of them have I obtained the slightest reference to my method, or any part of it. The forcible introduction of the conated hand or the separation of introduced fingers about covers all that I have learned from my friends or from obstetrical writers.

The employment of rapid manual dilatation must be restricted to cases of advanced pregnancy, when, for any reason, it is desired to effect prompt delivery. Its use presupposes the possibility of the full introduction of the index finger to its largest diameter without much delay or difficulty. If, with the patient anæsthetized, the index finger can not in a very few minutes be fully introduced, I should seriously doubt the possibility of a successful employment of this or any other manual method of dilatation, and should advise the operator, for the time at least, to cease further attempt. My experience with the method of manual dilatation about to be described is derived from its employment in 7 cases of placenta prævia, 6 cases of crossed birth, and 2 of eclampsia. In six instances, all of which were placenta prævia, no labor pains had preceded the employment of manual dilatation and consequent delivery of child, although a hæmorrhage had. It is possible that the very hæmorrhage which prompted me to effect immediate delivery was in itself an aiding factor in its speedy accomplishment.

An extensive obstetrical experience convinces me that while the previous occurrence of hæmorrhage and the particular location of the placenta may have made dilatation more easily possible, its influence in this relation was far from being a considerable one, and I am consequently left with the conviction that, after all, the undilated, unlabored os of normal pregnancy may not prove very much more obdurate and unyielding than the undilated, unlabored os of placenta prævia. If a woman at or after the seventh month of utero-gestation (not in labor) be anæsthetized with ether or chloroform, I believe it will generally be found an easy task to insert the index finger to its largest diameter, the hand having followed in the vagina. If the finger now be withdrawn so that its tip merely enters the os, it will usually be found possible to introduce alongside the tip of the thumb. When the tips of both index finger and thumb are thus within the ring, and the second finger sharply flexed, with the os resting on its palmar and inner latero-dorsal aspect, we have but to keep the index and second finger closely together to form a notch from which the os-uterine ring can not easily escape. For purposes of description and reference I will call this the first position of manual, or what might perhaps be more correctly termed digital, dilatation. The straightened and extended thumb, resting on the outer lateral side of the index finger, is now carried as far from the tip of the index finger as the enlargement of the os will permit. Considerable power for dilatation may indeed be exerted by continuing this movement of the thumb, but a much greater and far less fatiguing force may be exerted if we implant and immovably hold the thumb on the index finger, whilst forcibly and together flexing the index finger. When a little headway has thus been gained, we slightly extend the index and second fingers, which will permit the extended thumb to travel from the tip of the index finger, at which point we again press and hold the extended thumb firmly against the outer side of index finger. In this position the holding point is again taken, whilst tonic flexion of the index and second fingers continues the work of dilatation. After a while the fingers are again slightly extended, which will permit the thumb to be carried still further toward the metacarpo-phalangal articulation. Whilst holding it firmly on the index finger, flexion of the index and second fingers should be removed. If tonic flexion of the fingers has been steadily maintained, we shall now be able to introduce the index and second finger and thumb. This I will term the second position; the relation of the extended thumb to the first finger is maintained as in the first position, whilst the os encircling the thumb, and also the two fingers, rests upon the dorsal surface of the more sharply flexed third finger in the same manner as it rests on the second finger in the first position. The power for

stretching, too, is derived from fixation of thumb on first finger, whilst counter pressure is effected by flexing the index, second, and third fingers in the manner described for the first position. In a short time we shall have dilated sufficiently to permit the introduction of the third finger, which will constitute the third position. The os, still hooked over the top of the extended thumb, will now have its point of counter pressure between the third finger and the inner latero-dorsal aspect of the fourth finger. Again we resort to tonic flexion of all the fingers, and take up the gain by occasional slight extension of the fingers and movement of the extended thumb toward the metacarpo-phalangal articulation. We shall soon be ready for the introduction of the thumb and all the fingers, thus entering the fourth position. Here again enlargement is effected by flexion of all fingers, although the index and second will be flexed far less than the third and fourth fingers.

The limit of dilatation in the fourth position for a hand measuring 7¾ inches over the metacarpo-phalangal articulation (as measured for gloves) is 8½ inches (circumferential measurement).

I can safely assert that the extreme limit of possible and easy dilatation in the fourth position will not exceed the glove measurement more than 1 inch, which is scarcely sufficient for the easy introduction of the whole hand. I then resort to the fifth position, in which the os is made to encircle the first row of phalangal bones of the fingers and the second or last phalanx of the thumb. The movement required in this position is extension of the thumb and all the fingers, the tips of the fingers being at the same time flexed to lessen their encroachment on the intra-uterine space. A less fatiguing and somewhat more powerful dilating manipulation is the sixth and last position, which is effected by causing the os to encircle the second row or phalangal bones of the fingers and the first phalanx of the thumb.

In either the fifth or sixth position the degree of circumferential dilatation possible will exceed the glove measurement by at least 3 inches. This, of course, is a much greater enlargement than is required for the introduction of the hand into the uterus.

When the tips of first finger and thumb are in the first position for dilatation, the very slightly enlarged os will feel like an inelastic ring and the tissues composing it will approximate in size the coil of wire which I have formed into this ring, with which I will now endeavor to illustrate the positions and movements in each position.

During all these manipulatory movements of the thumb and fingers the hand reposes in the vagina, and so quietly, indeed, that if the work is properly performed bystanders will scarcely observe any appreciable movement of the wrist at the vulva. There is neither call for dragging down nor pushing up of the os; it is *in situ*, whilst the encroachments on the intra-uterine space, as you may have observed, is reduced to a minimum by flexure of the tips of the fingers in all the stages of every position. Any normal hand should endure the fatigue consequent to the accomplishment of rapid dilatation, if dilatation is possible. Having once failed to accomplish rapid dilatation, probably owing to inability to easily and fully introduce the first finger, I desire to again remind you that in any such case it may not be possible to effect dilatation by this method.

Eleven years ago, the late Dr. James C. Amiraux asked me to hasten to his aid, stating in his note that he was in attendance upon a case of placenta prævia, and that he greatly feared the patient would die of hæmorrhage. When I reached the patient's house the doctor informed me that the woman had been seized the day before with hæmorrhage, for which he had already twice tamponned her, permitting the second tampon to remain until my arrival. Upon its removal we found the vertex and a margin of the placenta presenting through a well-dilated os; the patient was almost pulseless, complained of thirst, and was so generally weak that we momentarily feared her death. The forceps were applied, and the very rapid delivery of a living child effected, after which the liberal use of brandy and hot applications accomplished an improvement in our patient's condition which eventuated in recovery.

This was my first experience with placenta prævia. Previous to that I had discovered the ease with which the gravid uterus, at or near term, could be manually dilated under anæsthesia, and I then resolved to try manual dilatation in place of tampon, should I at any time meet with the undilated os of placenta prævia. I had not long to wait, for just one year later I was called to see Case 2, a primipara,

First position.

Limit of dilatation in first position.

Second position.

Limit of dilatation in second position.

Third position.

Limit of dilatation in third position.

Fourth position.

Fifth position.

Sixth position.

RAPID MANUAL DILATATION OF THE OS UTERI.

English, aged 24. Upon retiring at night, and without pains of any kind, she was taken with a most profuse flooding. I reached her house about one hour after its occurrence; she was still rapidly flowing; there were no pains; the os admitted the index finger. With the assistance of Dr. Amiraux I anæsthetized the patient, and at once began manual dilatation of the os. In 21 minutes my hand entered the uterine cavity a foot was brought down, and in 28 minutes more, or in 49 minutes from the beginning of dilatation, a stillborn child and placenta came together. The woman recovered, without fever or embarrassment of any kind.

Case 3.—Mrs. S., ternipara, aged 30, had a slight hæmorrhage at seventh month, for which I think no medical advice was obtained. At the eighth month a very profuse flowing occurred, but no pains. The os readily admitted the index finger, which revealed placenta prævia. Dr. James W. Smith confirmed my diagnosis, and, after he had administered ether, I manually dilated the os, and introduced my hand in 20 minutes. The membranes were ruptured, one foot brought down, and the child and placenta were delivered in 45 minutes from the beginning of dilatation. The child was stillborn. The mother recovered, although not without a degree of puerperal fever, which was probably due to our inability to overcome the dangers of the unsanitary surroundings.

Case 4.—Mrs. S., the same woman as Case 3, two years later sent for me at midnight. She had been sleeping about two hours and was awakened by a pool of blood in her bed. Uterine gestation had probably advanced to the seven-and-a-half month. I saw her within an hour from the time she awakened. No labor pains had been experienced; the os rather tardily admitted the index finger. In a very short time Drs. James W. Smith and Millspaugh were kindly with me; the patient was etherized, and manual dilatation effected sufficient enlargement of os to admit the hand in 16 minutes. In 24 minutes more a stillborn child and the placenta were delivered. The patient made a rapid and uneventful recovery.

Case 5.—Mrs. C., quadripara, aged 30, was taken at the eighth month with a rather profuse flowing. I saw her six hours later at the request of her physician, Dr. Edward F. Doty, who informed me of the presence of placenta prævia, and also assured me that the os would scarcely admit one finger. She had had no pains. Upon my assurance that delivery could be at once effected, ether was procured, the patient anæsthetized, and manual dilatation begun. The hand entered the uterus in 22 minutes, one foot was brought down, and a living child (which still lives) and the placenta were delivered in 22 minutes more. The mother's convalescence was normal and complete.

Case 6.—German, aged 30; was taken with slight labor pains, which in 6 hours were attended with quite a profuse hæmorrhage, when Dr. D. T. Bowden was called. I went to the doctor's assistance, six hours after his first visit, and confirmed his diagnosis of placenta prævia. There were only occasional pains; the hæmorrhage continued, and the os would scarcely admit two fingers. I assured the doctor of my ability to quickly enlarge the os. With his consent, the patient was anæsthetized and manual dilatation begun. In 20 minutes my hand entered the uterus, ruptured the membranes, and brought down one foot. In 25 minutes more she was delivered of a stillborn child and the placenta. No hæmorrhage followed and convalescence was normal.

Case 7.—German, sextipara, aged 43. At the eight-and-a-half month of uterine gestation was taken with rather profuse and continuous flooding. The house was so cold and unsanitary that I at once removed the patient to the Paterson General Hospital. On the way, and after entering the hospital, she had a few very slight pains and a great deal of flowing. The os was dilated sufficiently to almost admit two fingers. With the aid of house physicians, Drs. McCoy and Fuentes, who anæsthetized the patient, I made manual dilatation of the os. In 18 minutes my hand entered the uterus, ruptured the membranes, and brought down one foot. In 32 minutes more a stillborn child and the placenta were delivered. The patient recovered without fever or embarrassment.

Case 8.—German, quintipara, aged 34; was seized with hæmorrhage at the eight-and-a-half month. The flowing was profuse and continuous, and not accompanied by labor pains. This case was seen at the request of and with William Flitcroft, and was also, for sanitary reasons, removed to the Paterson General Hospital. She reached the hospital about six hours after the occurrence of hæmorrhage, complaining of pain in her back, but did not seem to have any regular labor pains. She was still bleeding, and the os admitted three fingers. After a brief consultation with Dr. William K. Newton, my alternate in the obstetrical service at the hospital, the patient was anæsthetized, and he completed the work of dilatation with conated hand; introduced hand, brought down one foot, and delivered a living child and the placenta in about 25 minutes from the time of dilatation. The patient was discharged from the hospital in about two weeks.

Case 9.—German, ternipara, aged 36; seen with Dr. B. C. Maginnis about three hours after the occurrence of hæmorrhage. The os admitted but the tip of the index

finger. Having failed to effect rapid manual dilatation, I advised that we proceed at once to effect delivery. The patient was anæsthetized, and at the end of 50 minutes I suffered the embarrassment of announcing my inability to introduce the tips of index finger and thumb. Hæmorrhage had ceased, and I advised a delay of one week, unless the occurrence of hæmorrhage or other important symptoms called for interference. Vaginal douches of boracic acid solution were given twice daily. On the second day following the unsuccessful attempt at delivery, the patient was removed to a private room in the Paterson General Hospital. In just 6 days from the occurrence of the first flooding a second slight, but continuous, hæmorrhage occurred. There were no labor pains. The os was now found to admit the tip of the finger with greater facility than at the time of the first hæmorrhage. We introduced one of the smallest of Barnes's fiddle-shaped rubber bags and inflated with water by means of a piston syringe of known capacity. At the end of 1 hour it was emptied, removed, and replaced with one of the largest size. This was filled with water, and at the end of 1 hour the patient was anæsthetized and removed to the operating room. Upon removal of the Barnes dilator the os admitted two fingers. Dr. Maginnis began manual dilatation by my method; I concluded dilatation in 22 minutes from the removal of the Barnes dilator, brought down one foot, and effected the delivery of a stillborn child and the placenta in 55 minutes from the time of beginning manual dilatation. The patient made a normal and uneventful recovery.

These 9 cases cover my entire experience in the management of placenta prævia. All of the mothers recovered and three of the children lived. In 8 cases manual dilatation of the os was practiced to the extent of admitting the hand, and effecting podalic version. In only 7 cases was my method of dilatation employed. The shortest time required to dilate the os, from the easy insertion of the index finger to introduction of hand, was 16 minutes. The longest time was 22 minutes. The average time to dilate from one or two fingers to the whole hand for the 7 cases of this class was 19⅝ minutes.

The addition of the case operated by Dr. Newton, in which dilatation from three fingers to full hand was effected in 15 minutes, will lessen somewhat the average time for dilatation in the 8 cases.

The beginning of dilatation in Case 9 with Barnes's bags occupied 2 hours. This time does not figure in the above averages. I have little doubt that this case was ready for manual dilatation at the time of removing the smallest bag, or in 1 hour from its introduction.

The very short time required in any of the other cases to fully introduce the index finger—or its equivalent—the tips of index finger and thumb—is included in the figures from which the averages are taken. So that in each of the cases of manual dilatation the time given begins at the first touch of patient, and ends with the bringing down of one foot.

The withdrawal of the anæsthetic immediately after the performance of version usually enabled nature to quickly complete the delivery with the aid of slight traction upon the foot or leg, for almost as soon as the anæsthetic is withdrawn labor pains begin, and in a very short time they become both active and propulsive.

Now as to the time required for the completion of the second and third stages of labor. In the 8 cases the placenta either came with or so quickly followed the delivery of the head, in each instance, that the actual time of the so-called third stage was almost too short to admit of computation. The shortest time required to complete labor after turning was 10 minutes. The longest time was 33 minutes. The average time for the 8 cases was 25¼ minutes. The shortest time for dilatation of the os, the performance of version, and completion of delivery in any one case was 25 minutes. The longest time was 55 minutes. The average time for the 8 cases was 41 minutes. All of the mothers recovered, and 2 out of the 8 children lived. In five cases not a single labor pain occurred previous to rupture of membranes and the performance of version. The delivery was in each of these cases purely an elective operation. Two cases had a few slight and unpronounced pains. The remaining one of this class of 8 cases had been in actual labor 12 or 13 hours, with an almost continuous flow for 7 hours. In every instance hæmorrhage ceased

or was brought under control by dragging down one foot after turning. There was not a single instance of post-partem hæmorrhage to remind me of cervical laceration. One would suppose that such rapid dilatation of the os would of necessity have brought on dangerous hæmorrhage or very greatly increase the flow from placenta detachment. It is interesting to note that the amount of blood lost during manual dilatation was in no case sufficient to cause special anxiety or alarm.

I wish again to remind you that this method of dilatation should be effected with comparatively little encroachment on the intra-uterine space, and if properly performed we shall limit the area of placental detachment, and consequently the hæmorrhage, until the membranes have been ruptured and the leg brought down.

The extremely unsanitary surroundings of four houses, and my inability to satisfactorily mend these, made me gravely apprehensive of septicæmia. In one instance (case 3) my fears were in a measure realized. I need scarcely say that surgical cleansing of the hands, vulva, and vagina before operation, and in some cases irrigation of vagina and of uterus, also, with sterilized water after delivery was practiced with as much care as circumstances would permit.

The very brilliant achievements of Richard Lovner, Hofmeir, and Behn in the management of placenta prævia by the Braxton-Hicks method of bi-manual version would seem to leave no room for improvement. I have not pursued a somewhat different practice with the expectancy of affording better results than were attained by these gentlemen. As a matter of fact, my first two cases were operated before the publication of the practical and masterly report of Richard Lovner in the American Journal of Obstetrics. Stimulated with the satisfactory results in these two cases, I continued my practice without modification, and with the very gratifying results here given. To some extent others have in one way or another effected the introduction of the hand into the uterus in placenta prævia performed podalic version, and consequently delivery.

Some, doubtless with knowledge of the Braxton-Hicks method, have thus modified his treatment, but I am not aware that anyone has induced labor, and at the same time accomplished extensive dilatation of the os with such rapidity and with anything like the uniformity of result attained in the few cases here presented.*

DISCUSSION.

Dr. POLAK, of Brooklyn. That the subject of pregnancy is so comprehensive that one scarcely knows where to begin each and every one of the papers read this afternoon have been exceedingly suggestive and interesting. There is one point that has been brought up in my paper, and possibly it will be well to make it clear—in regard to cervical laceration.

Dr. HARRIS, of Paterson, N. J. Would like to know of Dr. Polak to what extent he had practiced incision of the cervix for undilated os? How performed? To what extent others had practiced it, and the especial indications for it? Also, if he had known fatal or alarming hæmorrhages from such incisions?

Dr. POLAK, of Brooklyn. The incisions as recommended by Dickersen are particularly applicable in those cases of accident as eclampsia, accidental hæmorrhage, etc., where immediate delivery in the interest of the mother and the child is

*After the reading of the above paper before the Pan-American Congress the author's attention was directed to the fact that Dr. A. D. Sinclair, of Boston, Mass., has taught and practiced manual dilatation of the os uteri to precipitate labor and effect rapid delivery in placenta prævia, thus making the measure an agent for the accomplishment of an elective operation in this relation. Dr. Sinclair's work antedated the author's by many years, *vide* transactions of the American Gynecological Society, 1880; also Boston Medical and Surgical Journal, Vol. XCII, p, 117 (1875). This practice, introduced in the Boston lying-in hospital by Dr. Sinclair, was followed by his colleague, Dr. Richardson, and others.

As to the manner of effecting the dilatation, Dr. Sinclair, in one paper, refers to accomplishing the work with "conated fingers;" in another paper he speaks of the introduction of "first one finger and then another, until all are introduced." No further description is found.—THE AUTHOR.

required. It must be remembered that the portio vaginalis should be effaced, and that the incision be made at the two posterior and anterior lateral angles of the cervix on each side, avoiding incision posteriorly and anteriorly, because of the danger of extension to the peritoneum. The hæmorrhages from these incisions can always be controlled by the aseptic suture, or if the conditions are unfavorable to immediate repair tampon the uterine cavity and then plug the cervical lacerations with iodoform gauze.

Dr. STEVENSON, of Chicago, Ill. Is there not danger of fatal hæmorrhage?

Dr. POLAK, of Brooklyn, N. Y. No case, so far as I can learn, has resulted in fatal hemorrhage. The method of incisions presents to me advantages over digital dilatation, (1) by having clean-cut incised wounds instead of the ragged tear which usually follows manual stretching; (2) the patient being in less danger of sepsis, not being subjected to a long period of digital manipulation.

Dr. DE WEES, of Kansas. After listening to the remarks of Drs. Polak, Harris, and Stevenson, I desire to bring before this congress my experience, with a few remedies whereby the division of the cervix has been prevented. I refer to chloroform and venesection. I have been frequently called in consultation for the purpose of dividing the cervix in cases where there was a thinned-out, rigid os wherein opium, belladonna, chloral, and all the usual remedies had been tried without avail, and incised division of the cervix was considered the last resort. In these cases I have invariably relied upon chloroform in the anæmic and venesection in plethoric cases, with prompt relaxation in every case where rapid forceps or version delivery was successfully performed.

Dr. POLAK, of Brooklyn, N. Y. In regard to chloroform, as suggested by Dr. De Wees, of Kansas, I must take exception to its use in labor until the os is fully dilated, notwithstanding recent authorities upon the matter. Chloroform has certainly in my hands caused post-partum hæmorrhage.

Dr. STEVENSON, of Chicago, Ill. Does not the use of iodoform to any great extent cause poisoning?

Dr. POLAK, of Brooklyn, N. Y. The use of iodoform by me has been quite extensive; in 68 cases I have left one-half a drachm and even a whole drachm, and no absorption has taken place; it simply acted as an antiseptic.

Dr. M. GUTIERREZ, of Mexico. I take issue with Dr. Polak, of Brooklyn, N. Y., in regard to incising the cervix in cases of placenta prævia, and urge the necessity of maintaining the integrity of the cervix upon the ground of the high degree of vascularity of the cervical zone at the seat of the placental implantation. I oppose the procedure of Braxton-Hicks in cases of placenta prævia, because if on the one hand it proves useful as a measure of compression, on the other hand it assuredly exposes the life of the fœtus. He calls attention to the fact that, whereas much solicitude is entertained for the safety of the mother, very little is shown for the life of the baby. This should not be so.

Dr. HARRIS, of New Jersey. We have every reason to believe that cases of placenta praevia are a considerable factor in the increase of the death rate of the child as well as to render it probably stillborn.

Dr. Mitchell had been accustomed to tell students that chloroform favored after-hæmorrhage, but he was beginning to think it a mistake.

Dr. Knox, of Pennsylvania, had found tartar emetic to hasten dilatation and delivery.

Dr. STEVENSON. I should like to ask Dr. Polak if he does not himself consider that with cases of low implantation of the placenta it is extremely dangerous to perform the method of cervical incisions?

Dr. POLAK, of Brooklyn. I have used the operation successfully in at least two cases of placenta prævia.

Dr. Henri Jaques Garriques, of New York City, said:

The principle of dilating the cervix and emptying the uterus is the right one.

Years ago Hofmeir, of Berlin, Prof. Schroeder's assistant, published a paper on the subject, in which he gave the statistics of a large number of cases treated by him in this way, and had a remarkably small mortality. The old way of dilating made use of the extensor muscles. The way proposed by the author (Dr. Philander A. Harris, of Paterson, N. J.) of the paper just read to cross the thumb and fingers allows us to use the flexors, which are much stronger, and would therefore seem to be a valuable improvement.

Dr. Robert A. Murray, of New York City, remarked that the able paper of Dr. Harris (Paterson, N. J.) had been heard by him with pleasure, and he agrees with him in this procedure of rapid manual dilatation of the cervix. About fifteen years ago, detailing 8 cases of placenta prævia centralis where this method was employed, 6 were saved, and all the mothers, one of the cases being the most severe I have ever seen, where the labor was ended in 17 minutes. A *sine qua non* is that the operator should have his hand thoroughly aseptic.

Hofmeir, of Berlin, has advocated that when placenta prævia was determined that the uterus should be emptied. This I believe almost axiomatic, but if we see the case when near term and when hæmorrhages have occurred, I believe that the cervix should be dilated, and the manual method is always the best, and that the uterus should be immediately emptied, unless strong contra-indications exist.

We may use the same method in puerperal eclampsia, or even in normal labor when the cervix is slow in dilating and the patient's power being rapidly lost.

In partial placenta prævia Braxton-Hick's method is very good, because the presenting part presses the placenta over and compresses it and stops the hæmorrhage, and the labor may proceed normally.

Dilatation, manually, of the cervix should also be practiced in delayed labor, as it is generally found that septic processes are in proportion to the length of time of the labor.

APUNTAMIENTOS PARA EL ESTUDIO COMPARATIVO DE LA PELVIS MEXICANA Y LA EUROPEA, Y CONSECUENCIAS PRÁCTICAS Á QUE DA LUGAR LA ESPECIAL CONFORMACIÓN DE LA PRIMERA.

Por los Doctores TOMÁS NORIEGA, *Miembro de la Comisión Ejecutiva del Congreso, Socio de la Academia de Medicina de México, Profesor adjunto de Patología General y Secretario de la Escuela de Medicina, Presidente de la Sociedad Filoiátrica y Cirujano del Hospital de Jesús, y* MANUEL GUTIÉRREZ, *Profesor de Obstetricia de la Escuela de Medicina de México, Miembro de la Academia de Medicina, Director del Asilo Español y Presidente Honorario de la Sección de Obstetricia en el Congreso Médico Pan-Americano.*

I.

La frecuencia con que se observan en México los partos que sin ser, propiamente hablando, distócicos, se señalan no obstante por la longitud del trabajo y las dificultades en su terminación, ha llamado la atención de los parteros mexicanos. Desde el año de 1871 el Sr. Dr. Don Juan María Rodríguez, catedrático de clínica de obstetricia en la Escuela Nacional de Medicina, sorprendido por la frecuencia con que se presentaban estos hechos en su práctica, tanto hospitalaria como civil, entregóse á pacientes investigaciones sobre el particular después de analizar una por una las diversas condiciones estático-dinámicas que constituyen los factores que intervienen en el parto natural, no habiendo encontrado la razón de esta anomalía en las fuerzas expulsivas, fijóse en las resistencias, logrando hallar en ellas la lógica y natural explicación del fenómeno indicado.

El resultado de estos estudios, expuesto por su autor en las lecciones clínicas de la Maternidad de México y en su obra intitulada "Guía clínica del arte de los partos," ha sido confirmado por los trabajos de los señores profesores Don J. Ignacio Capetillo y Don Nicolás San Juan, y posteriormente por los Dres. Don Florencio Flores y Don José de J. Sánchez Gómez, que hicieron de este asunto el objeto de sus tesis inaugurales, y cuyos cálculos y mensuraciones se refieren á sesenta y seis pelvis cuidadosamente disecadas y medidas.

Si hasta el presente los datos estadísticos no son tan copiosos que pudieran justificar una conclusión generalísima, la opinión de los médicos de nuestra patria y nuestra práctica personal confirman y ratifican las interesantes conclusiones que ha largo tiempo viene profesando y enseñando el sabio profesor de la Maternidad de México.

Así, pues, deseosos de daros á conocer algún asunto de nuestra medicina nacional, hoy que, aunque por breves instantes nos cabe la honra de hablar ante esta docta y primera asamblea pan-americana, haremos el asunto de esta pequeña nota la sucinta exposición de la doctrina de la pelvis mexicana.

II.

La pelvis, según el diccionario de la Academia Española, "es la parte del tronco que termina inferiormente el vientre, y contiene una parte de los intestinos y de los órganos urinarios y genitales, sirviendo al mismo tiempo de punto fijo á las articulaciones de los miembros inferiores."

La forma de esta parte del esqueleto, considerada en su conjunto, es comparada á una cavidad cónica truncada, algo aplastada de adelante á atrás, cuya base hállase situada arriba y adelante, en tanto que la cúspide mira hacia abajo y hacia atrás.

Distínguense en ella dos superficies, una exterior y otra interior.

La primera no nos ocupará, pues muy importante desde el punto de vista topográfico y patológico, lo es menos cuando se la considera exclusivamente en relación con el estudio de la obstetricia.

La segunda se subdivide en dos partes: la superior, llamada gran pelvis ó pelvis abdominal, y la inferior, conocida por las denominaciones de pequeña pelvis ó excavación pélvica. Entre ambas hállase una cintura llamada estrecho superior ó margen de la pelvis. La segunda se termina por otra cintura que se designa con el nombre de estrecho inferior.

La gran pelvis, que seguramente no tiene importancia desde el punto de vista del mecanismo del trabajo, es, sin embargo, uno de los factores de la acomodación durante el embarazo y á ello conspiran su conformación y dimensiones.

La distancia que separa las dos espinas ilíacas antero-superiores (diámetro transverso anterior) ha sido estimado en límites algo extensos; generalmente se le avalúa en 21, 23, 24 y 25 centímetros.

La distancia entre las porciones más altas de las crestas ilíacas (diámetro transverso posterior) es de 24 á 28 centímetros. (Plessmann, Schröder, Cazeaux, Cruveilhier, Nœgelé, etc.)

En la pelvis mexicana estas dimensiones divergen de las señaladas, siendo la primera de 22 á 23 centímetros y la segunda de 23.5 á 24.5 centímetros (Rodríguez) ó de 21.23 y 23 (Sánchez Gómez). Esta leve diferencia, especialmente en lo que atañe á la distancia que separa las crestas ilíacas, hace que, en las mexicanas, la cintura sea menos ancha que los hombros, pues el plano vertical elevado de la parte más alta de la cresta ilíaca, no raza el muñon del hombro como sucede en las francesas al decir de Cruveilhier. Además, la saliente de columna lumbar es exagerada con relación á la que ofrecen las pelvis europeas.

Son mucho más acentuadas estas diferencias en la pequeña pelvis.

El canal óseo-ligamentoso que la constituye se hace notar por la mayor altura é inclinación de su pared anterior, y por la reducción de sus diámetros; otro tanto acontece con los estrechos superior é inferior.

La altura de la pared anterior, no comprendiendo el ligamento subpúbico, es de 3, 4 y 4.5 centímetros en las pelvis europeas.

En la pelvis mexicana esta interesante parte del esqueleto femenino tiene por término medio 5.5 centímetros de altura, es decir, mucho mayor que en las razas de ultramar. Algunas veces llega á 5.7, 6.5 y hasta 7 y 8 centímetros; además está fuertemente dirigida de arriba á abajo y de adelante á atrás; y el ángulo que forma con la vertical, es, segun las mensuraciones del Dr. Flóres, de 45.

Las paredes laterales evaluadas desde el extremo del diámetro transverso del estrecho superior hasta el vértice de la tuberosidad isquiática, son de 8.50 á 9 centímetros.

La pared posterior, formada por las caras anteriores del saco y cóxis, y medida desde el ángulo sacro-vertebral hasta el vértice del sacro es de 12 á 13.5 centímetros (Naegelé); hasta la punta del cóxis siguiendo la curvatura sacra 13 centímetros (Cazeaux).

Entre nosotros la distancia del promontorio al vértice del sacro es de 11 á 11.5 centímetros; hasta la punta del cóxis 12 centímetros y siguiendo la curva sacro-coxigea 13.8 centímetros.

Los diámetros de esta cavidad son los siguientes:

Diámetro antero-posterior: En Europa, 12 á 13 centímetros (Cazeaux); en México, 11.50 centímetros (Rodríguez).

Diámetro oblicuo: En Europa, 12 centímetros (Cazeaux); en México, 12 centímetros (Rodríguez).

Diámetro transverso: En Europa, 12 centímetros (Cazeaux); en México, 12 centímetros (Rodríguez).

Estrecho superior: Diámetro antero-posterior: Europa, 11 á 11.5 centímetros (Cazeaux); México, 10.8 centímetros (Rodríguez); 106.2 milímetros (Sánchez Gómez). Diámetro oblicuo: Europa, 12 centímetros (Cazeaux); México, 12 centímetros (Rodríguez); 115.7 milímetros (Sánchez Gómez). Diámetro transverso: Europa, 13.5 centímetros (Cazeaux); México, 13 centímetros (Rodríguez); 124 milímetros (Sánchez Gómez).

Estrecho inferior: Diámetro antero-posterior: Europa, 11 centímetros (Cazeaux); México, 9.5 centímetros (Rodríguez); 85.5 milímetros (Sánchez Gómez). Diámetro oblicuo: Europa, 11 centímetros (Cazeaux); México, 10 centímetros (Rodríguez); 94.5 milímetros (Sánchez Gómez). Diámetro transverso: Europa, 11 centímetros (Cazeaux); México, 10 centímetros (Rodríguez); 93.4 milímetros (Sánchez Gómez).

El grado de inclinación del plano del estrecho superior, respecto del horizonte es en México de 61°50′. El del estrecho inferior de 18°35′.

A consecuencia de la mayor inclinación de ámbos estrechos, la punta del coxis es de 2 á 2.5 centímetros más alta que en las pelvis europeas; estos planos, especialmente el del estrecho inferior, son fuertemente inclinados hacia abajo y hacia atrás, de lo cual resulta que la vulva es casi horizontal, y exigua en estremo la extensión de la parte posterior del perineo, pues midiendo aquella 8 centímetros solo resta un espacio de 4 á 6 centímetros desde la comisura posterior á la punta del cóxis.

De esta disposición del piso perineal y de la mayor inclinación de la pelvis, se deduce que la dirección del eje de los planos de los estrechos es distinta que en Europa, pues pasa por puntos diferentes de los asignados por los parteros de ultramar.

Así el eje del estrecho superior, constituido por la perpendicular levantada en el centro de su plano, parte de un punto más inferior que la cicatriz umbilical, y prolongada hacia abajo toca el vértice del coxis.

El del estrecho inferior, al encontrarse con el del superior, forma un ángulo obtuso de seno muy abierto hacia adelante, toca un punto cercano al ángulo del promontorio y á veces pasa delante de esta saliente, como lo acredita uno de los casos descritos por el Dr. Flóres en su tesis inaugural.

Por último, la dirección de estos ejes determina la mayor inclinación respecto á la horizontal de la curva parabólica ó trayectoria del canal que es más cóncava.

Reasumiendo.—La pelvis mexicana se caracteriza por una reducción general de sus diámetros, tanto más marcada cuanto más se aproxima al piso perineal; esta reducción es debida sobre todo á la mayor inclinación y altura de la pared anterior de la excavación que es fuertemente dirigida hacia abajo y hacia atrás, así como también á la exageración del ángulo sacro vertebral.

III.

Las consecuencias que de semejante conformación se derivan, son en estremo interesantes.

En primer lugar, la reducción de las dimensiones de la gran pelvis y la mayor saliente de la columna lumbar hacen que la matriz, no acomodándose bien atrás ni á los lados, se dirija adelante, exagerando la antero-versión natural.

En segundo lugar, y teniendo presentes las dimensiones y dirección de la pared púbica, se explica un hecho de exploración obstétrica y ginecológica señalado mucho tiempo ha por el profesor Rodríguez, y es que al practicar el tacto vaginal se nota que, no obstante que el dedo es conducido de abajo á arriba y de adelante á atrás, raza con el arco púbico que está situado muy abajo, y que la extremidad del dedo toca con relativa facilidad la punta del cóxis y aún la cara anterior del sacro. El profesor Andrade y el doctor austriaco Schmidtlein, que ejerció mucho tiempo en México, fueron sorprendidos por este hecho en el principio de su práctica.

En tercer lugar, la mayor inclinación de la pelvis explica la relativa frecuencia de las presentaciones de cara, hecho sobre el que uno de nosotros (Gutiérrez) ha llamado la atención, indica también la facilidad con que en ciertas circunstancias, v. g., cuando se rompe prematuramente la bolsa de las aguas, se extiende la cabeza fetal convirtiendo las presentaciones de vértice en faciales, circunstancia observada por el profesor Capetillo, y asociada á la mayor saliente del promontorio es causa de la antero-versión uterina. Este vicio, sin ser llevado hasta sus límites extremos, es tan común aún en las nulíparas que la frecuencia con que uno de nosotros (Gutiérrez) prescribe el uso de la faja necesaria para corregirla ha dado á esta su nombre á pesar de no ser del autor.

Aunque en tesis general pudiera quizá decirse que el tipo pélvico, que á grandes plumadas hemos procurado bosquejar, es general en nuestro país, no es raro por desgracia hallarle exagerado algunas veces, constituyendo entonces un verdadero motivo de distocia; esta variedad de pelvis, llamada por el Sr. Rodríguez *acorazada* ó *abarrotada*, presenta en sumo grado los caracteres de la pelvis mexicana; de aquí la necesidad, cuando se trate del examen clínico de una mujer embarazada, de examinar atentamente la conformación y dimensiones de la pelvis.

Trátase ahora de estudiar las modificaciones que determina la pelvis mexicana en el mecanismo del parto.

Si el trabajo del parto tiene por objeto adaptar lenta, sucesiva y favorablemente los diámetros del ovoide fetal á los del canal que debe recorrer para que la expulsión se efectue de una manera regular, es evidente que si aumentan las resistencias permaneciendo idéntica la potencia, la expulsión del producto se hará, según los casos, difícil ó imposible.

En el que ahora nos ocupa, ningún obstáculo serio encuentra la parte presentada en la porción abdominal del canal pélvico, no obstante la leve reducción de esta región del esqueleto, su cavidad es aún bastante amplia; mas cuando el feto, impelido por las contracciones uterinas desciende á la pequeña pelvis, las condiciones dinámicas cambian por completo.

En efecto, para que el parto tenga lugar es preciso, es indispensable que los diámetros longitudinales del feto desciendan paralelamente á los diámetros oblicuos de la pelvis y salgan paralelamente á los longitudinales, mas para que esto se realice es forzoso que alguna de las regiones del cuello del producto, la posterior en las presentaciones de vértice, la anterior en las de cara ó las laterales en las de hombro, resulte al fin exactamente colocada detrás de la pared púbica.

Es inútil insistir sobre la importancia de este tiempo del mecanismo del parto que constituye la *conditio sine qua non* en todo desembarazamiento; mas ¿cómo podría realizarse cómodamente si á medida que la cabeza tiende de descender es llamada á penetrar en un conducto más y más estrecho? Y para no considerar sino la presentación de vértice, la mejor y más frecuente, ¿cómo podrá salir el occipital fuera del

arco púbico para disminuir los diámetros longitudinales de la cabeza y ejecutar el movimiento de extensión que la conduce fuera de la vulva?

He aquí, pues, bosquejado uno de los obstáculos, el primero y principal á que da margen la pelvis que nos ocupa, y que consiste en la lentitud, dificultad é imposibilidad de verificarse los movimientos de descenso, rotación y expulsión de la parte abocada, he aquí también un manantial posible de accidentes debidos á la compresión, contusión é inflamación de los órganos y tejidos de la pelvis.

Superable muchas veces por las fuerzas naturales, obliga, no obstante, al músculo uterino á exagerar su trabajo, lo que da por resultado la prolongación del parto con todas sus consecuencias.

En los casos nada raros entre nosotros, en que el trabajo muscular de la matriz secundado por la contracción de los músculos abdominales, no basta para terminar el parto, cuando á consecuencia de la excesiva contracción sobrevienen el agotamiento y la pereza musculares, ó cuando, en fin, existan ó no estas condiciones, la vida del feto parezca peligrar por la longitud del parto, hácese necesario terminarle artificialmente por medio del forceps, cuya aplicación es muy frecuente en nuestro país.

Salvado este primer tropiezo, viene otro de la mayor importancia, y debido á la reducida extención que tiene el perineo y á la configuración y dirección particular de la abertura vulvar. El parto, en tales condiciones, ofrece la misma lentitud é idénticos peligros á los que señalan los autores europeos con motivo del estrechamiento y rigidez vulvo-perineal; solamente que entre nosotros no es esto peculiar á las mujeres que se hacen grávidas en una edad muy avanzada, si no que, debido á la especial conformación de estas partes en las mexicanas, es muy frecuente en las primíparas.

En efecto, el plano músculo-aponeurótico, por el cual debe resbalar la cabeza, siendo pequeño y confinando en una vulva estrecha también, y que vé directamente abajo, no solo el ovoide cefálico se detiene mucho tiempo al nivel del estrecho inferior sino que apoyando durante la contracción casi exclusivamente sobre la comisura posterior, la desgarradura perineal puede decirse que es la regla.

De aquí el que en México no deba aceptarse la práctica seguida actualmente en algunas maternidades extranjeras, de abandonar el perineo durante el parto, confiando á la naturaleza el cuidado de preservarle; aquí se le sostiene cuidadosamente para prevenir una rotura, haciendo que su distención se efectue lenta y gradualmente.

Por último, para terminar esta incorrecta nota, apuntaremos un accidente que todos hemos observado, y cuya aplicación es bien sencilla; nos referimos á la hemorragia *post partum*, debida á la inercia de la matriz agotada por el esfuerzo hipernormal que se ha visto obligada á desplegar.

IV.

En resúmen, creemos que puede condensarse este humilde trabajo en las siguientes conclusiones:

(1ª) La pelvis de las mexicanas constituye una variedad que se caracteriza por reducción general de sus dimensiones, tanto más marcada cuanto más se aproxima al estrecho perineal; por la mayor altura de la sínfisis púbica; por la más grande inclinación de los planos de la excavación y de los estrechos; por la menor extensión del perineo, y por la estrechez y cambio de dirección de la vulva.

(2ª) Las consecuencias de esta configuración son:

(*a*) Algunas dificultades en la acomodación estática (antero-versión uterina).

(*b*) La manera particular con que debe procederse al tacto vaginal y á la aplicación del espéculo.

(*c*) Cierta tendencia á la presentación de cara, máxime durante el mecanismo del parto.

(3ª) El trabajo es á veces lento, prolongado y penoso, á consecuencia de las dificultades de los movimientos de descenso, rotación y extensión de la cabeza, y de los accidentes debidos á la permanencia de este ovoide en el canal.

(4ª) Las dificultades superables á veces exigen otras la intervención del arte.

(5ª) La configuración y dimensiones del piso y la salida de la pelvis, expone mucho á las rupturas perineales; siendo por lo mismo de la mayor importancia oponerse á ellas por el sostenimiento metódico y cuidadoso del perineo.

Dr. De Saussure, of South Carolina, asked Prof. Dr. Gutiérrez, of Mexico, for some information respecting the Mexican pelvis (the paper had been read in Spanish), through the kindness of Dr. Castellanos.

Dr. Gutiérrez, in reply to the inquiry of Dr. De Saussure, of Charleston, South Carolina: I would say that there are no peculiar differences in the fœtal head or its diameters, but there are in the particular parts of the Mexican pelvis.

ESTUDIO DE LA SANGRE DE LAS MUJERES EMBARAZADAS.

Por el Prof. Dr. F. ZÁRRAGA, de México.

Hasta la primera mitad del siglo todos los parteros creían que la mujer en el estado de gestación era pletórica. Ciertos fenómenos: la cefalalgia, los vértigos, las palpitaciones, los bochornos de la cara, las pulsaciones tan molestas de las sienes y el sueño invencible, fenómenos que se presentan en muchas de las mujeres que atraviesan este estado, parecían darles la razón; y más que todo esto el método que se seguía: la sangría hacía calmar todos estos fenómenos. Con todo vienen los trabajos clásicos de Andral y Gavarret, los de Becquerel y Rodier, seguidos de los de Regnault, fundados en análisis químicos. Cazeaux el primero levanta la voz contra el abuso de las sangrías, haciendo notar que aquellas mujeres están anémicas y que tal práctica deteriora su organismo ya minado por la presencia del feto que absorve sus jugos; recomienda los tónicos y los ferruginosos. Se acepta por la mayoría estas ideas porque nadie puede responder á las investigaciones químicas que han demostrado diminución de albúmina, diminución de hierro, aumento de agua.

De cuando en cuando alguna voz se levanta contra estas ideas. El heredero de Bouillaud, Peter, no podía menos de hacerlo; y aunque careciendo de hechos propios para combatir los ya citados, les objeta sin embargo que han hecho los análisis en personas de la más baja escala social, en personas á quienes la miseria, los males morales y el medio en que viven, han puesto en las peores condiciones. Les da por concedido que la sangre sea mala en calidad, pero no puede concederles que sea poca, que disminuya en cantidad y acepta la congestión y la plétora de una sangre mala.

Mas tarde Cazeaux, aceptando las ideas de Beaud sobre la clorosis, conviene en que hay hidrohemia en las embarazadas, y esta palabra se repite en todos los tratados de partos desde la célebre obra del autor citado, hasta la de Suvard, publicada en 1890, y la de Boudin y Crouzat, publicada en 1891. Todas, por lo menos las que yo conozo, dicen que hay diminución de glóbulos rójos, diminución de hierro, aumento de agua y casi todas se apoyan en los mismos trabajos que sirvieron de base á los de Cazeaux. Algunos fundados en los trabajos de Virchow nos hablan de una leucocytosis fisiológica, pero se contentan con dar el nombre, sin presentar los fundamentos de tal opinión.

Quinquaud, más recientemente, ha hecho trabajos sobre la dosificación de la hemoglobina, trabajos citados por Porac en su tesis de agregación, pero ninguno se ha tomado el trabajo, que yo sepa al menos, de contar los hematías como una contraprueba de los trabajos químicos de los primeros investigadores. Contraprueba enteramente necesaria. En efecto, Gavarret, Andral, Regnault, han concluido que

los hematías habían disminuido por que el peso de ellas en conjunto era menor, conclusión á todas luces errónea. Una madre y su hijo recién nacido pueden pesar menos que la madre sola antes de la gestación.

He querido pues, comprobar los resultados alcanzados por los autores citados emprendiendo yo mismo investigaciones sobre los cuatro puntos siguientes:

Tensión sanguínea, hemoglobina, número de los glóbulos rojos, número de los glóbulos blancos.

TENSIÓN SANGUÍNEA.

Si es una verdad que la masa de la sangre está aumentada, debe de estarlo también la tensión arterial. Así lo asientan muchos observadores, entre los cuales podemos contar á Barnes, el hijo, á Marey, á Lorrain, á McDonald, á Mahomet, etc. Unos de estos observadores se apoyan en observaciones hechas con el esfigmógrafo de Marey, y otros con el de Mahomet; así es que los únicos fundamentos exactos de esta opinión son los datos esfigmográficos. Ahora bien, Brondel en su artículo sobre esfigmografía, escrito en el diccionario de Jaccoud, hace notar lo erróneo que es atenerse al esfigmógrafo para conocer la presión intra-arterial; hace notar que el tornillo de tensión dará mayor vuelta á medida que aumente el calibre del vaso señalando el fenómeno de que en un mismo indivíduo se necesita dar distinta presión al esfigmógrafo en la radial derecha é izquierda para obtener los mismos resultados, lo cual está indicando solo la diferencia de calibre de ambos vasos. Si en un indivíduo con igual tensión sanguínea en el lado derecho é izquierdo se obtienen distintos resultados, se comprende lo deficiente del método para comparar resultados en indivíduos distintos.

Para medir la tensión sanguínea tenemos á la fecha instrumentos más precisos que el esfigmógrafo: son los esfigmo-manómetros. Hay tres principales, el de Basch, el de Potain y el de Verdin; los dos primeros fundan su acción en la medida que da un manómetro metálico de la presión ejercida sobre una esfera de caucho llena de aire ó de líquido y que á su vez comprime la arteria radial; el de Verdin se funda en el mismo principio que las balanzas de espiral metálico, solo que en tanto que en estas se miden tracciones, aquí se indican presiones. Los dos primeros son de un manejo más sencillo y las observaciones menos erróneas por tanto que con el último; por lo cual, para hacer mis investigaciones, disponiendo de los de Verdin y Potain, me atuve al último, por las razones ya mencionadas.

En el esfigmo-manómetro de Potain la escala va de una á treinta divisiones, siendo la de quince la que marca la tensión sanguínea normal.

Tensión Sanguínea.

Número.	Por ciento.	Número.	Por ciento.	Número.	Por ciento.	Número.	Por ciento.
1	18	14	23	27	25	40	20
2	20	15	18	28	20	41	19
3	17	16	23	29	26	42	18
4	16	17	22	30	21	43	18
5	15	18	21	31	19	44	20
6	14	19	19	32	20	45	22
7	24	20	18	33	23	46	22
8	22	21	16	34	17	47	23
9	27	22	17	35	18	48	18
10	24	23	23	36	15	49	23
11	19	24	22	37	27	50	22
12	14	25	18	38	22		
13	13	26	14	39	24	Media	19.5

La media que he obtenido de estas cincuenta observaciones es de 19.5, y esta cifra indica una tensión sanguínea exagerada.

Del cuadro adjunto se desprende que hubo 4 mujeres en las cuales esta tensión estuvo un poco abajo de la normal, 1 en que esta tensión estuvo en el límite normal y 45 en las cuales estuvo exagerada.

Puedo asentar lo mismo que dije en 1892 á la Academia de medicina de México. De mis observaciones se desprende que la tensión está aumentada y estos trabajos hechos con el esfigmomanómetro confirman los resultados obtenidos con el esfigmógrafo y con el simple tacto digital.

HEMOGLOBINA.

Desde los análisis de Becquerel y Rodier se notó que la cantidad de hierro contenida en las cenizas que provenían de la sangre de la embarazada era menor que en la que provenía de la mujer fuera de este estado. Sabiendo como sabemos que el hierro entra en la composición de la hemoglobina, podíamos a priori decir que la hemoglobina estaba disminuida.

Los trabajos de Quinquaud, y más posteriormente los de Cursi y Nicollo, han venido á dejar fuera de duda lo que antes sólo era una deducción. Si emprendí la dosificación de la hemoglobina fué porque teniendo á la mano los elementos necesarios y siendo cuestión de poco trabajo, fijaba la disminución y aun las variaciones que podríamos notar en las mujeres de nuestro país.

El instrumento empleado para la dosificación de la hemoglobina ha sido el hemómetro de Fleischl. Si he recurrido á él mejor que á otros de los que hay tantos, ha sido porque á mi ver es el que se adapta mejor á las necesidades de la clínica y de los que menos molestan á los enfermos por la pequeña cantidad de sangre que se necesita para los análisis. Las cifras marcadas por la escala de Fleischl son convencionales, pues la cantidad normal se representa por cien; pero basta recordar que la cifra real es de 14.6 para establecer una proporción y obtener la cantidad deseada.

Hemoglobina.

Número.	Por ciento.	Número.	Por ciento.	Número.	Por ciento.	Número.	Por ciento
1	85	14	60	27	70	40	50
2	65	15	70	28	45	41	65
3	65	16	65	29	50	42	60
4	55	17	80	30	75	43	75
5	60	18	60	31	60	44	80
6	80	19	75	32	65	45	70
7	60	20	80	33	70	46	60
8	85	21	60	34	75	47	50
9	65	22	65	35	80	48	55
10	70	23	80	36	45	49	75
11	70	24	85	37	65	50	60
12	45	25	55	38	70		
13	50	26	70	39	70	Media	65.8

No puedo menos que terminar estas observaciones que con la misma frase de mi anterior trabajo. Aquí los resultados han confirmado plenamente las investigaciones anteriores, pues en ninguna mujer estos resultados han llegado á la cifra 100.

GLÓBULOS ROJOS.

Para saber si las cifras obtenidas corresponden á la normal, debo recordar que el año de 1884 el Sr. Cordero presentó á la academia un trabajo sobre la sangre normal, en el cual señala como medio entre nosotros para la mujer la cifra de 4,500,000 de hematías por milímetro cúbico; con esta cifra compararé los resultados obtenidos.

El procedimiento que he seguido ha sido el de Thoma Zeiss, usando el instrumento de ellos y empleando como suero la solución de cloruro de sodio al 3 por ciento recomendada por Jacksch. El número de cuadrículos que he recorrido ha sido á veces hasta de 80, nunca menos de 40, con el objeto de aproximarme lo más posible á la verdad.

Glóbulos rojos.

Número.	Glóbulos rojos.	Número.	Glóbulos rojos.	Número.	Glóbulos rojos.	Número.	Glóbulos rojos.
1	6,400,000	14	4,640,000	27	4,640,000	40	5,640,000
2	5,200,000	15	4,000,000	28	6,500,000	41	5,000,000
3	4,600,000	16	5,340,000	29	5,500,000	42	5,800,000
4	5,440,000	17	5,680,000	30	4,640,000	43	4,800,000
5	3,200,000	18	5,580,000	31	5,420,000	44	5,980,000
6	5,600,000	19	5,420,000	32	5,440,000	45	5,200,000
7	5,040,000	20	4,640,000	33	5,000,000	46	6,000,000
8	4,800,000	21	5,800,000	34	6,000,000	47	5,020,000
9	4,880,000	22	5,600,000	35	4,800,000	48	3,900,000
10	5,960,000	23	4,800,000	36	5,340,000	49	4,640,000
11	5,800,000	24	5,900,000	37	4,400,000	50	5,220,000
12	4,280,000	25	5,040,000	38	4,280,000		
13	5,920,000	26	4,000,000	39	5,680,000	Media..	5,168,400

Por este cuadro se ve que en 42 mujeres la cifra de los glóbulos rojos ha estado en aumento considerable. De las 8 restantes solo en 2 estuvo muy bajo, pues la cifra fué inferior á 4,000,000. En el resto excedió de esta cifra. De aquí se deduce que no es exacta la opinión admitida por los parteros, pues en vez de encontrar esta cifra disminuida la hemos encontrado aumentada obteniendo una media de 5,168,000. Si á esto agregamos que no solo está aumentado el número de glóbulos por milímetro cúbico, sino que la masa sanguínea está también aumentada, se concluye que la proporción de hematías es mucho mayor de lo que establecen las cifras anteriores.

GLÓBULOS BLANCOS.

Siguiendo los consejos de Sappey no he querido estudiar los glóbulos rojos y los blancos en la misma preparación, sino que he destruido los rojos por el ácido acético á fin de que resalten los blancos aislados del resto. La solución acética recomendada por Jacksch es al $\frac{1}{3}$ por ciento. Debe mezclarse una parte de sangre con 9 de la solución, y para ello me valí del capilar de la pipeta del instrumento de Zeiss, capilar que se encuentra dividido en 10 partes iguales; tomaba una de sangre y limpiando cuidadosamente la punta de la pipeta tomaba las otras 7 de la solución acética, y quitando el exceso de líquido, de la punta arrojaba todo en un vidrio de reloj pequeño, mezclaba los líquidos y después lo colocaba en la celdilla de Zeiss para hacer la numeración por campos del microscopio.

Glóbulos blancos.

Número.	Glóbulos blancos.	Número.	Glóbulos blancos.	Número.	Glóbulos blancos.	Número.	Glóbulos blancos.
1	7.600	14	7.200	27	6.250	40	5.000
2	8.100	15	5.350	28	7.000	41	5.600
3	3.200	16	9.000	29	3.800	42	3.200
4	5.450	17	3.850	30	5.550	43	3.800
5	5.550	18	7.350	31	5.400	44	6.450
6	5.600	19	6.350	32	3.600	45	4.150
7	3.800	20	20.000	33	3.750	46	3.800
8	6.550	21	3.200	34	6.000	47	3.200
9	4.150	22	5.000	35	5.150	48	4.150
10	7.250	23	5.600	36	3.150	49	4.150
11	6.750	24	6.450	37	4.250	50	8.200
12	6.750	25	4.600	38	8.250		
13	8.250	26	4.150	39	4.750	Media..	4.735

El Sr. Cordero, en sus investigaciones sobre la sangre de la mujer mexicana, ha encontrado una media de 5.923 glóbulos blancos. Sacando la proporción de mis observaciones he obtenido una media de 4.735. Por ella se ve pues que el número de estos elementos está disminuido de una manera notable.

Mi objeto al hacer un estudio de los leucocitos no ha sido sino el numerarlos; no puedo pues decir si predominan unos ú otros de los descritos por Metchnikoff.

Después de estos resultados ¿podemos decir que Cazeaux tiene razón? ¿La sangre de las embarazadas es análoga á la de las cloróticas? Leo en Jacksch que la sangre de las cloróticas se caracteriza por la diminución de la hemoglobina con poca diminución de los glóbulos rojos. En el caso podía decirse que estando disminuida la hemoglobina se encontraba la característica de la clorosis. Pero esta diminución es relativa. Si pongo una sustancia colorante, un grano por ejemplo, en un litro de agua tendré medio milígramo por gramo de líquido; si agrego á aquella solución otro litro de agua, tendré medio milígramo por gramo, y sin embargo nada se ha sustraído de la materia colorante. Lo mismo puede pasar en la sangre; ha aumentado la masa de ella, hecho que parece confirmar mis observaciónes sobre la tensión sanguínea, y aumentando esta tiene que disminuir la hemoglobina en un volúmen dado.

Los glóbulos rojos han aumentado y la numeración hecha por mí no señala este aumento, sino de una manera relativa, por milímetro cúbico; pero si se acepta que también ha aumentado el número de milímetros cúbicos convendremos que este aumento es mucho mayor. Es cierto que estos glóbulos son más pobres en hemoglobina, pero siendo tanto su aumento podemos decir que la hemoglobina está mejor repartida.

No podemos pues asegurar que la sangre de las embarazadas se parezca á la de las cloróticas, porque en estas no aumenta el número de glóbulos rójos, porque en estas no hay tampoco aumento de tensión sanguínea; y además porque no está demostrado que en las embarazadas la hemoglobina haya disminuido de una manera absoluta.

CONCLUSIONES.

En las mujeres embarazadas:

(1ª) La tensión sanguínea está aumentada.

(2ª) La hemoglobina está disminuida relativamente.

(3ª) Los glóbulos rojos están notablemente aumentados.

(4ª) Los glóbulos blancos están notablemente disminuidos.

Estas conclusiones nos pueden dar explicación clara de ciertos fenómenos observados en las mujeres que atraviesan la preñez y el puerperio.

(1º) La tensión aumentada nos explica los fenómenos pletóricos que se observan en estas mujeres.

(2º) La cantidad considerable de hematías y el mejor reparto de la hemoglobina nos dan cuenta de la resistencia de estos séres á las abundantes pérdidas sanguíneas.

(3º) Si los glóbulos blancos son los fagócitos que se oponen á las infecciones que nos invaden, se comprende que al disminuir estos, sea más fácil la infección y de allí la explicación de la facilidad con que la puérpera es infectada, y por tanto la obligación en que se encuentra el partero de hacer la antisepsia más rigorosa.

DISCUSSION.

Dr. ZÁRRAGA, of Mexico. I would be pleased to have the respective opinions of the physicians present as to whether the fœtal heart is accelerated or retarded when asphyxia is pendent. Mexican physicians agree upon the former (accelerated) condition, the opinion of European physicians to the contrary notwithstanding. This action of the fœtal heart is independent of the mother's condition. When retardation in the fœtal heart's movements does occur, all opportunity of intervention is lost. Hence the period [point] of its regular acceleration should be highly [readily] appreciated [recognized] and most effectively utilized.

Dr. HARRIS, of Paterson, N. J. To what extent arterial depletion of the mother

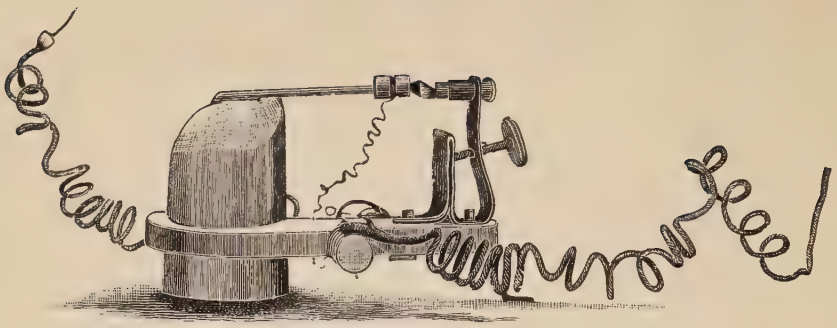

Fig. 4.

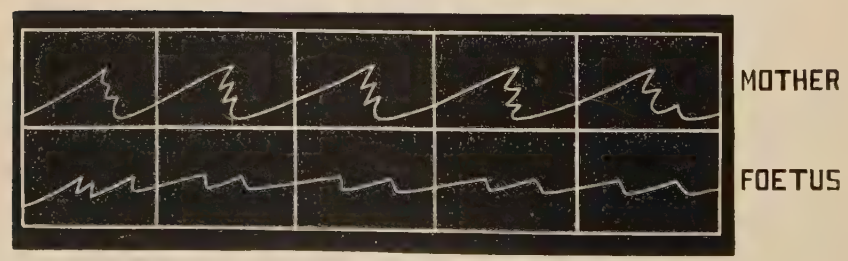

Fig. 5.

DR. HAMILTON'S CARDIOPHONE.

by loss of blood may enter into the question of asphyxia of the fœtus, or whether Dr. Zárraga, of Mexico, means those cases where no arterial depletion of the mother has taken place?

Dr. ZÁRRAGA. The observations that have been made were independent of the mother's condition altogether *per se*. In the actual condition of fœtal asphyxia, are the heart beats accelerated or are they retarded? In Mexico it is believed from observation and the impression is that the heart beats are accelerated during fœtal asphyxia.

Dr. STEVENSON, of Chicago, Ill., said: It occurs to me, without thinking very long over the subject, that the heart beats would certainly be accelerated, but would be retarded at the close; as death supervened the heart beats would grow slower. At first there should be acceleration. Asphyxia is certainly a lack of blood to the nervous system of the child. The effect would be acceleration and latterly retardation and death.

Dr. ZÁRRAGA. The symptoms of acceleration are noticed at first and toward the end there is a weakening of the heart and consequent retardation of its motion.

Dr. STEVENSON. It seems to me that the diagnosis of rapid heart beats is a sign of approaching fatal asphyxia, and Dr. Zárraga's observations substantiate that point.

THE APPLICATION OF GRAPHICS TO THE FŒTAL HEART SOUNDS.

By HUGH HAMILTON, M. D., Harrisburg, Pa.

It is unnecessary to consume time to relate the history of the discovery of the sounds of the fœtal cardiac pulsations in pregnancy or even the many instruments devised to easily recognize them. The bibliography of the subject is readily accessible.

The object of this paper is to apply electricity to magnify and record their bruits.

Among the signs of pregnancy the fœtal heart sounds are the surest of a number of phenomena. The subjective signs have their value in diagnosis of the condition of the female; also several objective ones are found with a degree of constancy.

The heart sounds are prominently mentioned as certain in most text-books; however, even these in some positions of the fœtus are difficult to find in order to confirm the other less positive indications. This one sign is subject to the experienced ear, often qualified by one's preconception of the case. The design of this instrument is to raise it out of the domain of sense into that of record, so that these tracings may be distinguished from those of maternal origin.

To accomplish this result I have modified a microphone suggested by Dr. Hürthle, of Breslau, Germany,* and carefully noted the criticisms of Professor Medicinæ Doctor Martius, of Rostock, Germany,† which it is not essential to reiterate here.

The coke-carbon is used because of its low conductivity. Sometimes the apparatus will show a small spark when rudely disturbed while connected, but no harm can come of it; the ordinary house batteries will furnish sufficient current. The principle is that it only operates when the current is interrupted, hence the use of articles of low conducting qualities. This is then put in curcuit upon the primary core of an induction coil; the induced or magnified current of electricity is then deflected into an ordinary telephone receiver, and also upon the sciatic nerve of a freshly killed frog, rat, or mouse, the most sensitive galvanometer in turn attached in balance to a Maurey tambour. (See fig. 4.)

* Uéber die Erklärung des Cardiogramms mit Hülfe der Herztonmarkirung und über eine Methode zur Mechanischen Registrirung der Töne.

† Cardiogramm und Herzstossproblem.

The slightest movement of the tympanum of the cardiophone will cause the telephone receiver to vibrate with magnified vigor, so that it can be heard for 3 to 4 meters (10 to 12 feet) and the nerve of the frog leg to contract and record its markings on blackened (smoked) paper fixed on a drum 150 millimeters (6 inches) in diameter, making one revolution in four or five seconds. Placing one cardiophone on the aorta of the mother and another upon her abdomen at the proper point, connected in two circuits, they are brought to record their marks on the same cylinder, so that the parallel tracings of the one exceeds the other by one-half, or similar, as the case may be. The pulsations of the fœtal heart being 140 to 160, and the cardiac impulses of the mother from 75 to 80 beats per minute, makes the difference in the cardiographs.

The instrument is made as follows: An electric light carbon (i. e., of coke) is made into a double cone (*see* fig. 1); two cups of electric-light carbon (*see* fig. 2), con-

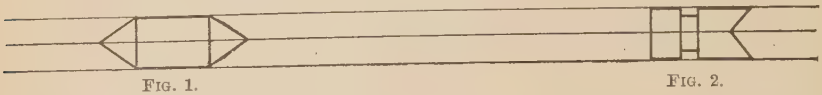

Fig. 1. Fig. 2.

nected with the poles of an electric current; a lever bearing one of these cups attached to a diaphragm of any vibrating material, as the thinnest parchment paper, fastened on the top of a receptacle to convey the vibrations to the membrane; a movable post containing the other carbon cup, capable of being adjusted to an infinitesimal degree, supporting the "double-coned" carbon between them, making a commutator for the apparatus (*see* fig. 3).

Fig. 3.

In very fat individuals, or certain positions of the child in utero, it is impossible to hear these sounds or to get perfect records.

I have only completed the instrument sufficiently to take one tracing, but hope to construct its mechanism so that it may be of practical benefit in the differential diagnosis of pregnancy and tumor conditions.

Should the several soufflés give symmetrical markings, then it would be conclusive evidence of their being maternal.

This crude instrument is my own workmanship. It is necessary to search for the sounds of the fœtal heart and then place the cardiphone on the best point for hearing them. The tracings will designate their source. The whole apparatus when completed will occupy a box 75 by 75 by 150 millimeters (3 by 3 by 6 inches), and weigh 120 grammes (or about one-fourth of a pound).

The telephone receiver is not necessary; any indicator would do. Its usefulness is only confirmatory of the sounds heard.

I trust that this simple application may enable one to place the sometimes difficult diagnosis in this matter upon a scientific basis, i. e., from that of sense to this of record.

RECENT ARTICLES.

(1) Deutsch. Med. Wochensch'ft. (No. 4) 26th of January, 1893, p. 77.

(2) Deutsch. Med. Wochensch'ft. No. 29) 20th of July, 1893, p. 685.

(3) V. Frey, "Das Plateau des Kammerpulses" Arch: f. Anat. u. Physiol: 1893.

(4) A. Schmit, "Cardio-graphische Untersuchungen" Ztschr. f. kl. Med. Bd. 22.

(5) Engelmann, "Beobachtungen u. Versuche am suspendirten Herzen." Pflug: Arch: f. Physiol: Bd. 52, 1892.

(6) Edgren, "Cardio-graphische u. Sphygmo-graphische Studien." Skand: Arch: f. Physiol: Bd. 1, 1889.

(7) Foster, "Physiol:" Phila., 1891.

THE STATUS OF OBSTETRICS IN GENERAL PRACTICE.

By ELIZA H. ROOT, M. D.

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In the two great kingdoms of organic life the process of fruit bearing is attended with risk. In the healthy capsule of the vegetable mother we find the blighted and withered seed, as we find the blighted and mummified ovum or fœtus in the animal mother. In both kingdoms utilitarianism stamps the laws of reproduction. The tree gives up its life for its fruit as the animal mother gives up her life for her offspring.

Blight, faulty development, and misplaced conception take place with sufficient frequency in the human race to make the function of child bearing one of risk.

No woman conceives without assuming these risks, which involve, more or less, the life and health of herself and child.

Notwithstanding this delicate function is attended with so many unavoidable, and what may be termed natural, risks, we find it treated as a matter of course by the masses, and by far too much so by the medical profession at large, a profession held to be capable and ready to relieve the people who must come to it in their physical extremity.

Indifference shown toward so important a subject, one that is vital to the home and the State, must and does bring with it a train of preventable risks to the child-bearing woman. It follows, then, that the risks to which the child-bearing woman submits are of two classes: (1) Preventable and (2) unpreventable. To the first class of risks only we will invite for a few moments your attention:

"I have not been well since I had a miscarriage, or since this or that child was born," is the reply that so often goes to make up the case histories of the gynecologist. He is led to ask, Why is the physiological function of child bearing so frequently followed by health-ruining results?

The conditions which prompt the patient to seek relief belong to one of two classes or to both combined:

(1) Traumatisms and second inflammations: Traumatisms may be considered as avoidable and unavoidable, alike amenable to treatment that will lessen the risks of a disastrous after-condition of the patient. Traumatisms consist of lacerations and contusions of portions of the parturient canal, the uterus, cervix, perineum, and vaginal walls, with resulting fistulæ; vesico-vaginal and recto-vaginal, with displacements and subinvolution of the pelvic organs. As a result of the second class, or inflammations, occur subinvolution, metritis, endocervicitis with follicular hyperplasia and hypertrophy, with or without erosions of the everted fragments when the cervix is lacerated; ovarian and tubal disease, with displacements and adhesions of the pelvic organs, due to septic infection at or during the lying-in period.

These causes which give rise to so varied and painful a train of symptoms may be traced to ignorance and carelessness, first of the accoucheur, who may serve as physician or midwife; second, to carelessness and ignorance of the patient and her friends, and thirdly, to incompetent care of the lying-in, which rests chiefly with the nursing.

When a physician assumes the responsibility of the lying-in room, without sufficient clinical training, disaster must surely follow in his footsteps. Didactic lectures, with a few demonstrations upon the manikin in the lecture room, will not suffice to make an obstetrician of anyone, no matter how intelligent. The young physician must go out into practice and work under great difficulty, reaching an indifferent proficiency at the cost of his patients and of no small expense to himself. It would indeed be interesting to know how many physicians now in general practice assumed the responsibilities of the lying-in room without having had any clinical training whatever. Our American colleges are beginning to realize their deficiency in this branch of clinical teaching, and are seeking to furnish their students with hospital and out-door practice in midwifery. In the clinic room only can the knowledge of how and when to judiciously use the forceps and other means of artificial delivery be learned. In the clinic room we must learn and teach when to interfere and when not to interfere with the process of labor; when and how to interfere with the course of gestation; when and how to use ecbolics, anæsthetics, and disinfectants. We must there begin to learn how to study each patient singly; learn to measure her individual powers of endurance and their relation to the means we may have to employ for her relief. It requires a series of cases to enable the student to gain a fair proficiency in observing and recognizing the features of his case,

and on no account should he be sent out to try his "luck" without having the importance of the features of labor firmly impressed upon his mind.

The student of clinical midwifery, to best accomplish proficiency, must bring with him a knowledge of general medicine that will qualify him to practice in any other one branch of medicine or to do a good general practice. He is still better fitted to profit by clinical study if he has been in general practice for at least a year. As midwives are now taught in the maternity hospitals of continental Europe and Great Britain, they constitute a source of danger to the lying-in patient when transferred to our own country. Their training consists of from five to six months' actual practice in the lying-in chamber. They are taught to make diagnosis by external examinations, and to care only for normal and spontaneous labors. So long as they keep within the limits of their sphere, to which they are strictly held by the laws of European countries, they are doubtless useful members of society. But they are complained of, even there, as mischief doers in obstetrics. Though the laws are strict, it is hard to keep their practice within the limits of their training. As a rule, the pupil midwife has but little, if any, general education or culture and no medical training whatever. Her training proves to be a house built upon sand. She can not form correct judgments in complications and emergencies that may arise and must be thought of and prepared for in every case of labor. For who knows what a labor may bring forth?

She too frequently shows herself incapable of forming correct judgment in cases that are normal in themselves. Abnormalities frequently arise by reason of her meddlesome intervention. Lacerations of the perineum go unrepaired; delayed, retained, and adherent placentæ are tampered with. Her training forbids her dealing with these complications. She is permitted to use only the simple disinfectants or antiseptics, with cleanliness of the hands. But when of careless habits she soon falls away from these restrictions, and sepsis follows her service. The children too frequently find their way to the dispensary with sore eyes, and the mothers are soon compelled to seek relief from conditions following traumatisms and inflammations. She has no knowledge of medicines, and gives, empirically, ergot or an anæsthetic, frequently doing serious mischief thereby.

The training of the midwife is so limited that the moment she leaves her hewn line mischief follows. I would not condemn the midwife entirely, for she might be made especially useful among the poor of our large American cities. But I must raise my voice against the meagreness of her education and against the license which the laxity of our laws governing the practice of midwifery and her own ignorance of consequences lead her to take.

Are we as American physicians doing all in our power to advance scientific knowledge and usages in this important and to me sacred field of labor? Why do we allow the existence of a class of persons whose practice ranges from inducing abortions in early pregnancy to attempts at delivery at full term by artificial means, with ignorance and consequent lack of moral principle as the only guide for action?

Verily, we are not, and for this we are responsible. Ignorant and careless as the midwife may be, she is less dangerous in a community than the licensed physician who is careless and willfully ignorant of his duty as a birth helper. Much more is expected of the physician than of the midwife. Let puerperal fever follow in the footsteps of the midwife, a board of health will prohibit her from plying her trade for a given time. But the person bearing the title of physician may scatter disease and traumatisms throughout a community with but little question.

The occurrence of sepsis in the lying-in woman is less excusable in the practice of a physician than in the practice of the midwife.

I have heard physicians say, "I have never lost a case in confinement." Very good, but how many of your patients were sick? How many had phlegmasia alba dolens or a mammary abscess?

A small death rate is not a true indication of careful aseptic midwifery. It is the sick rate that tells the story. In a hundred cases we may have two or more deaths from eclampsia, with no other cases of sickness or death. In a second one hundred cases we may have no deaths, but fifty or more of the cases may be sick, some going very near the valley of death, but all recovering to go about burden bearers because of neglected traumatisms and the results of inflammation.

The second one hundred cases with no deaths show a worse state of midwifery than the first one hundred cases. There is a tendency, not only in general practice, but in hospital practice, to put too much stress upon the death rate of the lying-in and not enough upon the sick rate.

Take care of the sick rate and the death rate will take care of itself. I have also heard physicians say they never had a laceration of the perineum occur in their practice. Very well, if true. Did you examine carefully to see if a laceration had occurred? If your fingers were not educated sufficiently to detect the ragged and roughened surfaces of a lacerated wound, did you make ocular examinations? One physician replies to these questions, "I never did; I never saw a confinement case

until I went into practice." Another replies, "I was taught or told to do these things, but my patients are sensitive women and would object to examinations that, to their mind, were unnecessary." To such reasons for not properly caring for a patient I have only to say they are inexcusable. A sensible patient, who has confidence in her physician, will consent to what is necessary to her welfare if the matter is put clearly before her. If the patient still insists upon refusing the examination or the operation for repair, she should be given to understand the probable consequences of neglect. It is my plan to have my patients understand before confinement about what may occur, in order to remove occasion for a new terror to arise at a time when she is least fitted to meet it. The practice of paying only one visit after delivery, as prevails in some sections of our country, is fatal to good results. It seems to me a lack of skill, and ignorance of consequences alone can be satisfied with such practice. The fee should be made large enough, when possible, to provide for at least three visits after delivery. If the fee can not be made adequate because of the patient's poverty, no poorer work should be done by the physician who consents to take charge of the case.

Money, valuable as it is, is not the only requisite in the practice of medicine. Under no circumstance can the obstetrician afford to do indifferent work. Carelessness and ignorance on the part of the patient frequently put the very best skill and enduring patience of the physician to a severe test. He will know nothing of a nephritis until called to a case of eclampsia that with proper and prompt treatment might have been avoided. Constipation during gestation is a frequent source of annoyance and danger to the lying-in period. Fever frequently arises from the retained and reäbsorbed waste matters of the body. As a rule, this fever disappears when the bowels are unloaded; but neglected during the period of gestation and during the lying-in is often productive of serious results, destroying the patient's life or making a lifetime invalid of her.

I have in mind a case in which paralysis occurred during the lying-in period, and has since been followed by insanity. That I believe to be directly traceable to neglected constipation during gestation and the time of confinement. The physician made one visit the morning after delivery and left no instructions for the patient's further comfort. He also knew for some time prior to confinement that he would be called to the case, but so far as I could learn he had made no inquiry into her condition. In this case the ignorance or carelessness of the physician, together with the patient's ignorance of consequences, combined to destroy the health of a good wife and mother. The happiness of a home was forever destroyed. What excuse can a physician offer for such neglect? The lady was not only willing to follow her physician's advice, but to pay him for his services.

The carelessness of the physician is too often responsible for the ignorance and carelessness of the patient. It is the physician's duty to instruct his patient as to the value of timely advice and to warn her, for his own protection at least, of the consequences that may follow her own neglect. For in no branch of medicine will a fatal outcome prove more disastrous to the reputation of the physician than in the practice of obstetrics.

Attention to the surroundings and nursing of the patient must not be left out of the obstetrician's code of duty. They should be held well in hand under all circumstances.

With the most adverse surroundings the physician who makes free use of the cotton sponge wrung out of a sublimate solution strength, 1 to 3000 or 1 to 5000, and surgically clean hands and finger nails, will be enabled to keep at least a clear conscience.

Again I must ask, are we as American teachers of obstetrics doing all we can, all we ought, for the training of our students. When we consider the manner in which municipal politics rule the majority of the public hospitals in our country, denying our medical schools clinical privileges in the lying-in wards of county and city hospitals, I realize we face something harder to reform than general obstetrical practice itself.

Cook County Hospital, of Chicago, Ill., affords a striking example of the conservatism of political rule. Not even a post-graduate course can be secured in this immense hospital. The numerous advertised "Private homes for ladies before and during confinement," scattered throughout our large cities, are hotbeds for puerperal sepsis and vice. They, too, rob the profession of a large amount of clinical material.

It is the duty of the medical profession to aid in stamping out these dens of vice, instead of giving them support or condoning their existence, as is done by too large a number of its individual members. With these secret hiding places and closed free wards, maternity hospitals where instruction is given will need to struggle not only for existence, but to gain popularity as safe places for confinement. What can be done to secure practical training for students in the face of such obstacles? What seems to me to prove the most likely plan for success is that of an outdoor practice

among the poor, as practiced by the schools of midwifery in Great Britain and by the outdoor plan now in operation in the city of New York.

The outdoor plan could be carried on in connection with the so-called settlements like the Hull House, of Chicago, or university settlements for the diffusing of knowledge among the poor of our cities. The work should be placed in charge of a duly graduated, young, enthusiastic, and trained student of obstetrics. Over him or her could be placed one or more able and experienced obstetricians as consultants. The students to be called should be advanced workers, each student to take a room easy of access to the district in which he is to do his work and remain there for his term of service. Practical work in the presence of and under the guidance and instruction of the superintendent could be given the student. In connection with the system of district nursing now in vogue in most of our large cities the outdoor plan could readily become a two-edged benevolence. The service rendered the poor would be far superior to that now received from the practice of midwives.

Obstetrics of general practice would be raised from a condition not far removed from "folklore" to a scientific, antiseptic basis. The lying-in sick rate could be not only reduced, but could be ascertained with reasonable correctness. When sepsis did occur its source could be found out and studied, and preventive medicine would gain rich contributions of ascertained facts. The adaptability of each student for the practice of midwifery could be learned and studied, and the student be advised accordingly. Motherhood might be robbed of many of its terrors. Is it not our duty to do all we can to make this delicate and important function a safe one? Motherhood is woman's great prerogative, and when she folds her new-born babe to her bosom she has achieved the very highest in life and love, with all their possibilities before her. Must we not only learn ourselves, but teach our students to enter that sacred chamber with a full sense of the responsibility we assume? We should and must enter it with clean hands and all the skill at our command. One who is afraid of hard work, who is not willing to forget himself in the exercise of his high functions, should never choose obstetrics for his work. To me that sacred chamber is full of poetry, often tragic, sometimes painfully pathetic, as in the case of Hermione and her disowned Perdita, but it is never comic.

DISCUSSION.

Dr. Upshur, in discussing the paper of Dr. Root, commended her practical ideas and warmly indorsed the views she expressed. He elaborated the importance of previous care of patient and the importance of accurate knowledge of her previous history as to dysmenorrhœa, menorrhagia, and collateral history of hæmorrhage in her family, if a primipara; condemned the hurry in labor progressing satisfactorily, and denounced the very faulty practice of the midwife, especially in the South.

As to Dr. Chestnut's paper, he indorsed the views expressed by him and thought what he said covered the ground. One difficulty he did not mention—the late time of engagement in many cases, which was often beyond our control.

Dr. Gutierrez, of Mexico, congratulated Dr. Root upon her important paper, which afforded him the opportunity of exposing the incompetency of the Mexican midwife, even in the most elementary requisites. On this account it has been proposed in Mexico that the education of female applicants for the exercise of midwifery should be regulated and divided: (1) Study of eutocia and bacteriology, one year; (2) dystocia and antisepsis, together with clinical instruction at the maternity, two years; (3) and finally, a three-year interneship at the Maternity Hospital.

Dr. Stevenson, of Chicago, expressed views in accordance with those enunciated by Dr. Root in her paper, and spoke at length upon the incompetency of foreign midwives in Chicago, who, although restrained and qualified in continental Europe, took upon themselves the practice of obstetrics in the West without any of those regulations required of them abroad. She had seen cases time and again that were due to incompetent practice of obstetrics by this self-constituted class, a menace at once to our population, spreading disaster in homes and making orphans.

Dr. De Saussure, of Charleston, S. C., spoke of some of the peculiar traits of the negro midwives in his locality. As long as things went well they never sent for a physician; but the least thing out of the usual course of their experience, they immediately sought the services of an obstetrician. I will speak later on this subject.

Dr. Hugh Hamilton, of Harrisburg, Pa., then offered the following resolution:

Resolved by the section on obstetrics of the Pan-American Medical Congress, That we do hereby protest against the practice of obstetrics by foreign or domestic midwives without proper regulations.

This motion was seconded by Dr. Stevenson, of Chicago, Ill.

Upon motion of Dr. Upshur, a committee to be appointed by the Chair should take this matter in hand, taking this resolution as a nucleus.

Dr. Mitchell, the executive president, then appointed the following committee: Drs. Root, of Illinois; King, of Washington, D. C.; Upshur, of Virginia; Gutierrez, of Mexico; Stevenson, of Illinois; Zárraga, of Mexico; Chestnut, of Pennsylvania; Castellanos, of Louisiana; and Hamilton, of Pennsylvania; to report at its convenience.

The committee on resolutions being ready to report, the following was offered:

Resolved, That the section on obstetrics of the Pan-American Medical Congress protests against the irregular practice of obstetrics by midwives, and that in view of the grave dangers to the community incident thereto, recommend that the boards of health or licensing boards of the various States refuse to grant licenses to applicants to practice midwifery who have not received technical instruction and preliminary training of at least one year in competent schools, and passed an examination in obstetrics equivalent to that required from the applicant for a degree in medicine.

Resolved, That copies of these resolutions be sent to the licensing boards or boards of health of the several States.

The resolution was passed unanimously, without remarks.

THE INDUCTION OF PREMATURE LABOR.

By JOHN H. W. CHESTNUT, of Philadelphia, Pa.

A due and well-founded appreciation of the comparative fitness of things is one of the requisites of an obstetrician and it is essential to its possession that he have an intimate acquaintance with the technique and the underlying basis of reason of the various practices that have received the sanction of accumulated experience.

In no conjunction of circumstances will this axiomatic statement be more clearly apparent than in the consideration of the groups of cases in whose management the operation for the induction of premature labor may be a proper procedure. In view, therefore, of the good uses of the induction of premature labor, with a keen realization of the value of the operation in appropriate cases, and with a conviction that it has not been consdiered or employed as frequently as its merits would demand, I have selected it for your present consideration.

The groups of cases whose circumstances may call for the operation include—

(1) Cases of contracted pelvis, which would render labor at term dangerously difficult to the mother, to the child, or to both.

(2) Cases of maternal disease, which progressively endangers the life of the mother.

(3) Cases in which in previous pregnancies the child has died in the latter weeks of gestation.

(4) Cases of hopeless disease of the mother, for the sake of the child.

(5) Cases in which the child is known to be dead.

(6) Cases complicated by the presence of ovarian, bony, or malignant tumors.

In the first class of cases, that of contracted pelvis, I am convinced by personal experience that the relative number of markedly contracted pelves is very small; certainly it is so among American women. In an active private obstetrical practice of more than twenty years, running from 16 to 25 personally conducted

cases per month, for many years, but one case of pelvic deformity occurred that resulted in the death of the mother. In this case the antero-posterior diameter of the brim was about 2¾ inches; the patient died after craniotomy.

Cases of lesser contraction, where the antero-posterior diameter was from 2¾ to 3¾ inches, were occasionally, although rarely met, and in 5 of the cases craniotomy was required, the others being delivered by the forceps or by version alone, or by the forceps after version. However rare the cases of contracted pelvis in my practice, they were sufficient to emphasize the point which I desire to make in this paper; that early pelvic examinations, followed in such cases by the induction of premature labor, would afford the most valuable chances for the life of the child and would conduce to the safety and welfare of the mother.

In a flattened or generally contracted pelvis, an antero-posterior diameter at the brim of 3 inches or less renders the delivery of an average-sized living child at term, if not absolutely impossible, except by Cæsarian section, yet extremely difficult and dangerous; and in cases where the deviation from the normal is less marked, say in cases of conjugate diameters of from 3 to 3½ inches, we must in weighing the merits of prospective methods consider also prospective dangers.

In considering the disposition of a pregnancy at term with such a pelvis we must reflect on the dangers of damage to the soft parts of the mother by long-continued pressure, on the frequency with which uterine inertia accompanies general exhaustion, on the known fact that malpresentations are more common in contracted than in normal pelves. We must weigh the risks to the child's life by compression in the molding of the head in the pelvis in tedious labors; we must remember the greater frequency of prolapse of the cord in those cases, and the probability of its undue compression in case we fail to turn and deliver rapidly, or to successfully replace it. We must consider the possible injury to the child's head by its forcible pressure against the promontory of the sacrum, as may occur in forceps cases where dragging force is applied. We must modify our conclusions as to the viability of a living fœtus to correspond with general statistics, with the results of operative measures, and with the knowledge that a large percentage of those fœtuses born living die soon. Moreover, to appreciate the advantages of the operation for induction of premature labor we must review our operative measures applicable at term and we will find that however useful they may be, they are not devoid of drawbacks.

The forceps and version have their familiar perils. Cæsarian section, even with the improvements in technique and betterments in results since the development of Sanger's method, is still a formidable operation, fraught with great danger to both parties in interest. The same criticism applies to the brilliant operation of laparoëlytrotomy and both are open to the objection that when called for the necesary skill to perform them is often not to be obtained. Pubiötomy, whose simplicity of design and facility of execution have raised it from the dead, is open to the objections that the operation is frequently followed by troublesome and dangerous hæmorrhage, that union between the parts severed is difficult to secure, and that if sufficient separation is obtained to be of practical value the the pelvic strength is continuously impaired.

In view of these considerations, of the results of the operation as published, and of the results in my own practice, a few cases of which are hereafter detailed, I believe that in all cases of contracted pelvis, when the antero-posterior diameter at the brim is from 2¾ to 3¼ inches, and in cases of equally contracted pelvis where the same diameter is 3½ inches, labor should be induced before term when the opportunity to recognize these conditions is presented.

This difficulty of diagnosis is the principal obstacle to the more frequent employment of the operation; but if physicians would, as a matter of ordinary duty, make pelvic examinations when consulted in regard to taking charge of expected confinements there would seldom be great difficulty in deciding then on the proper course to be pursued. In my opinion, the physician so consulted should always inquire as to the previous physical history of the woman, should note by inspection her general development, whether or not her abdomen is unusually pendulous, and should in all cases make an external examination by pelvic measurments, and if not in all cases, certainly in all doubtful cases he should make a vaginal examination. Personally I can see no good reason why he should not avail himself of the most important avenue to a correct knowledge of the field of future labor. The external measurements of any value are three, and can readily be obtained by using a large pair of carpenter's calipers whose arms are connected by a sliding bar, to be retained at a determined opening of the points by a thumbscrew, and the distance between the open points measured on a common rule.

The first is the distance measured between the depression or fossa just below the spine of the last lumbar vertebra and the middle process of the symphysis pubis. It should be from 7½ to 8 inches; if materially less it would indicate a flattened pelvis. The second is the distance between the anterior, superior spines of the ilii, and will average about 10 inches. The third is the distance between the centers of the crests of the ilii, and will average about 11 inches. The relations of the latter two measurements furnish valuable indications; if they are of average length, or if the distance between the crests is 1 inch greater than that between the spines, the pelvis may be considered as normal. The relations of these measurements may deviate from the normal in various ways and with corresponding indications. When they deviate at all, a vaginal examination should be made. When a vaginal examination of the pelvis is made the hand is the most reliable instrument, and previous experience will enable the examiner to recognize any marked deformity and to get a comparatively accurate idea of its size and of the character of its outlets. Only one measurement need be made, the diagonal conjugate, measured from the lower edge of the symphysis pubis to the promontory of the sacrum. This distance, measured by the index and middle fingers, less one-half to two-thirds of an inch, according to the depth of the symphysis, will give pretty accurately the length of the true conjugate of the brim.

If the careful examiner can not reach the promontory of the sacrum with his middle finger, there will be no antero-posterior contraction. It goes without saying, that this important diameter is not alone to be considered, but is to be viewed as indicative of the general capacity of the pelvis, as well as of the most difficult point to pass.

I have selected the following cases as illustrative: In the first case the pelvis measured 3¼ inches at the brim, and in the first confinement, in October, 1885, I depended upon compression and traction with the long forceps, and when a dead child was delivered the result was attributed to the necessarily increased duration of delivery dependent upon rigid and slowly dilating soft parts. A second pregnancy terminated in November, 1886. At my first visit, finding that the dilatation of the os was progressing, I introduced a large sized Barnes bag moderately filled with warm water, to keep up the pains and to prevent the rupture of the membranes. When the dilatation was fairly complete I ruptured the membranes and turned the child, but was obliged to deliver the head with the forceps. The child was born living, but died during the first day. The woman became pregnant again in July, 1887, and on March 13, 1888, I induced premature labor at the end of the thirty-fourth week of gestation, and on the next day she had a speedy delivery of a living child, which did well. In May, 1892, she was again delivered, at the end of the thirty-fourth week of pregnancy, of an average sized child, which also lived. After both of the induced labors the mother made a rapid and satisfactory recovery.

In the second case, I was called to see a lady in consultation on November 6, 1889. She was a primipara, and had then been in labor forty-eight hours. She had an antero-posterior curvature of the spine, with a markedly contracted pelvis, afterwards ascertained to measure less than 3 inches at the conjugate diameter. As repeated efforts had been made to deliver with the forceps, and as she was in an exhausted condition, it was decided to perform craniotomy at once. This was done, and delivery effected with considerable difficulty. After the delivery it was suggested to her physician that should she live and again become pregnant, premature labor ought to be induced. She made a slow but good recovery. In June, 1890, she was sent to me to arrange for her confinement. She had become pregnant early in February, and I fixed September 29 as the time for her delivery, 33 weeks after the supposed beginning of pregnancy. At the time fixed, labor was induced and she was safely delivered, with the assistance of the forceps, however, of a living child which is living yet. In February, 1891, she again became pregnant, and when consulted I determined, in view of the large size of the last child, to terminate the gestation at a somewhat earlier period, and fixed upon 220 days, 31 weeks and 3 days from the supposed beginning of pregnancy, for the time for her labor. In accordance with this arrangement she was delivered of a living child on September 22; but I must have erred in my calculations, or in the data on which they were based, for the child was small and poorly developed and lived for only five days. The mother made a prompt recovery. In January, 1893, she was again delivered

safely, at the end of 33 weeks of her pregnancy, of a well-developed living child, and in this instance also the induced labor was terminated with the assistance of the forceps. It is my opinion that these results were better than could have been obtained in these cases by any other procedure, and they have strengthened my conviction that in the hands of the general practitioner of obstetrics the operation for the induction of premature labor is the best method to employ in the management of cases of flattened or contracted pelvis, within the limits heretofore described. Exceptional skill with exceptional experience may be a law unto itself.

In the other groups of cases submitted as conditionally calling for premature delivery, no pelvic difficulties are involved or presupposed.

The second group includes cases of maternal disease, which progressively endangers the life of the mother. Among these may be placed some cases of chronic disease of the heart or of the lungs, uncontrollable vomiting, chorea, convulsions, and albuminuria. In regard to the cases of this group the experience and judgment of the physician must decide in each case how much the termination of labor would benefit the patient and how the specially threatened disaster would be affected by a labor.

My own experience in cases of this kind has been limited to three cases of organic heart disease and two cases of convulsions due to albuminuria. The results were satisfactory. In cases of albuminuria I would now, before deciding to induce labor, hopefully try the chloroform treatment as recommended by Dr. Duff, of Pittsburg, which treatment I have known to be successful in several cases in the practice of Dr. Hulshizer, of Philadelphia.

The third group includes cases where in previous pregnancies the child has died in the latter weeks of pregnancy. When the death appears to be due to inanition, or if the cause was unknown, I believe that in a succeeding pregnancy premature labor should be induced.

For fourth group of cases of hopeless disease or injury of the mother, for the sake of the child, should include but few cases. Where hopeless injury occurs to a healthy woman advanced in pregnancy, as by grave accident, the child would have better chances by Cæsarian section or by laparoëlytrotomy; and where the maternal disease is hopeless, a labor, however hastened, would probably shorten her life, and if it resulted in the birth of a living child its existence would in most cases be short and miserable.

The fifth group includes cases where the child is known to be dead. Here the operation is indicated as soon as the fact of death is definitely settled. Nature will strive to accomplish the work, and the sooner the woman is freed from the dead burden and its tenement cleaned, the sooner she will be free from the dangers of septicæmia; and there is, too, the great advantage of proper preparation for the labor.

The cases of the sixth group, those complicated by the presence of ovarian, bony, or malignant tumors, will more frequently call for artificial abortion than for premature labor. However, notwithstanding the generally conceded irritability of the gravid womb, I am still in doubt as to the propriety of sacrificing the fœtus rather than attacking the diseased growth. I have known a cystoma to be removed and pregnancy continue; I have known a stellated laceration of the cervix to be repaired, the operator unconscious of an existing early pregnancy, and fœtal life to proceed undisturbed to its full term; but in appropriate cases, where the pregnancy had progressed until the period of viability of the child, it would be better to encounter the expected dangers of an induced labor than to passively wait in terror of the future.

Except in cases of abnormal pelvis and of dead children, the time to perform the operation will depend upon the urgency of the individual case, but if the welfare of the child is considered a time not less than thirty weeks from the estimated beginning of pregnancy should be fixed upon and, when possible to wait, a delay of two weeks or more would be of material benefit to the child.

Various tables of measurements of the fœtal head at different periods of gestation are found in the books. The observers, however, differ considerably in their

opinions. Shroeder's measurements, which are frequently quoted, show that the biparietal diameter of the head is, between the twenty-eighth and thirty-second weeks, about 3¼ inches, and between the thirty-second and the thirty-sixth weeks about 3½ inches. It is to be remembered in this view that in premature deliveries the head is much more compressible than at term, although it is also evident that the greater facility of compression is attended with graver consequences if exerted to any marked degree. Within the limits of pelvic contraction suitable for the operation, delivery can almost always be safely effected at the end of the thirty-second week.

The operation.—Many methods have been employed to induce labor, each of which probably has its advantages, but as catheterization of the womb has always fulfilled the required indications satisfactorily for me, and as I have become somewhat familiar with that method, I have not recently essayed any of the other modes recommended. On the day preceding that fixed for the labor the woman is given a teaspoonful of compound liquorice powder and the next morning a rectal injection of warm water. She is then given a warm bath, and if she is a primipara a curved elm tent is dipped in boiling water and introduced to start the dilatation of the cervix. In the afternoon she gets a hot vaginal douche of a five-grains-to-the-ounce solution of boracic acid. She is put to bed on her back, with her hips at the edge of the side of the bed; her feet supported by chairs. If a tent has been used it is now removed, and a soft catheter, which has just been scalded, or a light, flexible, hard-rubber uterine probe, which has been similarly treated, is guided by the fingers of the left hand to the mouth of the womb and passed between the membranes and the uterine wall, allowing about 1 inch to remain in the vagina. According to the capacity of the vagina a medium or large sized Barnes bag, previously well washed and scalded, is placed in the vagina and moderately filled with warm water. The woman is allowed to remain in bed. In about twelve hours, occasionally in less time, labor is fairly active. The rubber bag has by this time probably been expelled, but unless the labor is progressing rapidly it is again well washed and replaced, to remain until dilatation is pretty complete, for its pressure stimulates the uterine pains and tends to prevent the rupture of the membranes. When the Barnes dilator is removed from the vagina, the catheter may be removed from the womb. The conduct of the case is then precisely as at full term. With the pains frequent and severe and the cervix rigid, I have found that a drachm of antimonial wine with one-twelfth of a grain of morphia hastened relaxation. In most cases the cautious use of an anæsthetic toward the termination of labor is a comfort and a benefit to the patient. In the management of these cases prior to delivery, as well as in their after treatment, that thorough, perfect cleanliness which we call antiseptis is more essential, if that be possible, than in labors at full term. The limits of the paper preclude any remarks as to the care of the child.

In conclusion, if the facts set forth and the opinions expressed herein are not new, it may still be hoped that their reiteration will not be unprofitable, in view of the facts that by far the greater number of practitioners approach an accouchement with no very definite knowledge of the general or local conditions with which they will have to deal, and that too often all unprepared, they are then obliged to seek the aid of the obstetric surgeon. The miscalled conservatism that seeks to evade radical or heroic measures when rationally indicated merits only reprobation, but the frequent contemplation of measures that provoke prevision and prevention is always laudable.

AIDS TO EASY PARTURITION.

By A. J. C. SAUNIER, A. M., M. D.

Aids to easy parturition and their application should be begun early in life, if the physician has the opportunity to do so. If the family physician would but consider the relief he might give in the future to those who are liable to become his patients in the girls who are growing up in the homes where he is called as medical adviser, and correct errors in the mode of living, dress, and exercise, it would be a boon to his female patients and the more firmly ground himself in the trust and esteem of his clientele. This supervision might with advantage begin in the childhood of some patients, and from the time of puberty to the beginning of married life, or longer, in many others. The mother should be warned against allowing her girl to indulge in any habits tending to depreciate the general health, and especially anything tending to cause weakness or disease of the pelvic organs. Some of these may be briefly mentioned, as the prevention of congestion of the pelvic organs by the use of warm undergarments, especially during menstruation; the interdiction of heavy lifting or long standing, which tend to cause displacements; the prevention of constipation, that most fruitful source of trouble in producing congestion, stagnation, and debilitation in the venous supply of the pelvic organs; also the habitual retention of urine, which distends and weakens the bladder and presses the uterus backwards; climbing stairs of high city buildings, both at home and at school; sedentary habits, with lack of good muscular exercise; the use of illy applied or tighly laced dresses. And here I wish to express the opinion that a good, well-fitting, easy corset is far superior to the baneful habit of tying heavy skirts tightly about the waist to drag down the abdomen, thus displacing all the organs within and beneath it. All these may have a very great bearing upon a future parturition, though seldom thought of by the young woman or her parents, and generally neglected by the family physician.

After impregnation many details may be considered which in themselves may seem trivial, but in the aggregate produce a marked influence at the close of gestation, when nature engages in the interesting process of childbirth.

Diet is one of the important items to consider. The fact must be taken into mind that the woman is now eating for two persons instead of one. Certainly the child will be made up of constituents from the mother's food, and by controlling this we may control the condition of the child's body at birth.

Every accoucheur will admit the facility with which the head and bones of a child will shape themselves to the parturient passage, if they be soft and cartilaginous, and everyone will also recall the delay and the distress to the mother where the bones of the child have become so far ossified as to make them but slightly yielding to the pressure which should temporarily distort them to allow passage through a narrow pelvis.

The condition of the child's bones can be controlled by the food taken by the mother during the nine months of gestation as easily as a person can be fattened or reduced in adipose tissue by regulation of diet. Those foods containing the earthy salts in large proportion are to be avoided; such are corn bread, oatmeal, graham bread, beans, and all the cereals containing large quantities of earthy phosphates. On the other hand, the patient should use the more starchy foods, as white bread, potatoes, with most kinds of vegetables, and especially fruits. The latter are valuable in a two-fold manner, by keeping the bowels free and by causing a solution of the earthy salts of other articles of food, allowing them to be carried off by the kidneys instead of being deposited in large quantities in the forming bones of the fœtus.

I have many times noted the softer, more cartilaginous condition of the bones of the new-born infant, where the mother had eaten largely of acid fruits during her gestation. This deficiency can rapidly and easily be corrected after birth by changing the diet of the mother to the kinds of food previously prohibited, and thus supplying bone-making material through her milk to the nursing infant.

All pelvic troubles, of whatever nature, should be carefully looked after during gestation, and corrected as far as practicable; especially should inflammatory conditions receive treatment. Oftentimes an inflammation of the pelvic organs, so intense as to produce severe pain upon digital examination, will exist for several months during gestation and continue up to and after labor.

If digital examination gives pain, what must be the poor woman's suffering when the passage of the child occurs!

These should invariably be treated by local applications to prepare her for the trial ahead. Many physicians refuse to give local treatment to a pregnant woman, but I have repeatedly demonstrated the utility of such where needed and the immense relief given to the patient thereby. They may be used from the beginning of pregnancy to the day of parturition without injury, if carefully and judiciously applied.

The correction of malplaced organs should be undertaken even to the application of pessaries, which may be worn to the end of the fourth or fifth month, though I believe the soft, inflated rubber instrument or the properly applied wool tampon to be better than any form of rigid support.

The occurrence of varicosities of the lower limbs or vulva is a sign of pressure by the gravid uterus upon the veins of the pelvis, and should be corrected; especially varicosities of the genitals, which may become so distended and the blood vessels so weakened as to permit of their rupture during parturition, with the formation of a hæmatoma. The best form of treatment is for the patient to wear an antiseptic wool tampon in the vagina, which should be renewed every three to five days. This acts as an elastic cushion for the heavy uterus to rest upon and takes the pressure from the veins, allowing an unimpeded return current of blood. The frequent assumption of the dorsal or genu-pectoral position also assists in relieving this condition.

Every physician appreciates the value of baths and vaginal injections at all times, and should endeavor to cultivate their use among his patients, especially during pregnancy.

Occasional vaginal douches, particularly if made antiseptic by some of the weaker germicides, tend to keep the genitals in a healthy state of tonicity and to prevent the entrance of germs during parturition and consequently the disastrous maladies which may attack the mother after the labor.

Hot hip baths, enemeta, vaginal douches, and hot wet cloths during the last week of gestation, and especially in the earliest stage of labor, tend to relax the perineal and sphincter muscles and thus allow an easy and quick passage of the child. I regard this as one of the most important means of securing an easy parturition, and know of nothing which will make flaccid the perineal tissues and relax the sphincters of uterus, anus, and vagina so satisfactorily as heat and moisture. But the water used in the hip bath, injection, or by means of saturated cloths to perinæum, must be *hot*, not warm. At least a temperature of 118° F. must be used and continued for a long time. In cases of uterine inertia the hot douche will stimulate muscular contractions of the uterus as well as to relax the tissues below; but in some cases of inertia, where the liquor amnii is small in quantity, it will be found necessary to rupture the membranes to bring on the required contractions.

Another means of abridging the first stage of labor and bringing on the expulsive pains is to institute a gentle massage of the abdomen.

This tends to quicken and strengthen the contractions of the uterine muscle, and may be kept up even during the intervals of pains throughout the labor. It will also be of frequent value in shortening the time of the physician's stay at the bedside, and save valuable time to him at the same time it assists the patient.

Contractions of the uterus may be stimulated by the mere presence of the examining fingers in the vagina, but as frequent examinations are both dangerous and unpleasant the hand should be placed in position only after a thorough antiseptic cleansing, and left there, often assisting in the dilatation of the os, for half an hour to an hour or more at a time.

This brings us to artificial dilatation of the os, a process which is often necessary and can be painlessly accomplished without injury and without rupture of the membranes.

The introduction of one, two, or three fingers, as the os will permit, and gently, steadily pressing outward, passing the fingers around the inner circle of the opening os, should be employed during each pain, till the uterus is so far opened as to allow the protruding bag of waters to finish the dilatation. In cases where the amniotic fluid has already been evacuated, this process may be continued till the head is engaged in the opening or till the dilatation is sufficient to permit of such engagement. This is far preferable to any form of mechanical dilator ever invented. If the os be very rigid the use of an ointment of belladonna and opium, or, better yet, of cocaine, applied on the rotating finger tips, may be used. A hypodermic injection of morphine will also tend to relax a rigid os, and if not used in too large doses will cause no cessation of uterine contractions.

If opportunity offer, the accoucheur should ascertain the position of the child before labor begins, and should a breech or lateral presentation occur it should be changed to a head presentation. The best time to perform cephalic version is about two weeks before expected labor. It is done by the patient lying on her back with the knees and thighs flexed while rotary passages are made by the hands of the physician on the abdomen in such manner as to press the child's head down into the pelvis and bring the limbs uppermost in the abdomen.

The assumption of the genu-pectoral position during this maneuver will often materially assist in its accomplishment.

At some time before the discharge of the amniotic fluid the clothing of both bed and patient should receive attention. It is unecessary to say they should be clean. Any old cloths, possibly loaded with a choice variety of filth and germs, will not answer, though such an opinion exists among some people.

Under the bed sheet should be spread a sheet of rubber or common table oilcloth, which will amply protect the bedding beneath.

The patient should have on a warm under vest and clean night dress, the one she expects to wear for at least a day after childbirth. These should be neatly and smoothly folded or rolled up almost to the armpits; a roll of cloths or towels placed in the hollow of the back to prevent the clothing working downward, and also to prevent blood or other discharges working upward. She may put on an old skirt or wrapper over these to be taken off after the labor is over, if she please. Such preparation will save much discomfort during and after parturition. If the accoucheur causes the rupture of the amniotic sac, as is often required, a tin washbasin or a bed pan should be placed beneath the hips to avoid wetting the bed and clothing, and the same use should be made of the vessel when the placenta or blood clots are to be expelled; then there will be very little soiled linen to remove afterward.

Should the amniotic fluid be entirely lost before labor pains start or should the pains cease after the fluid is discharged at any stage of the labor, the immediate induction or restoration of parturient contractions is in order. The majority of dry births, with their attendant misery and suspense to the mother and danger to the child, might be obviated if the physician be enterprising enough to assist nature to throw off the child which is delayed by a halt in the natural process, and which is generally caused by a lack of tonicity in the muscular structures of the mother.

This is best accomplished by means of kneading or massage of the abdomen to incite uterine contractions with one hand, at the same time dilating the os by the fingers of the other hand to secure both contractions and an open passageway for the child.

During this stage, and also later on, nature often produces by reflex action more or less severe vomiting, which has the effect of relaxing the parturient canal and materially assisting in delivery. When the tissues of this canal have been found hard and unyielding, I have sometimes induced emesis by having the patient drink large quantities of lukwearm water, which is easily thrown off the stomach and causes a general muscular relaxation.

It is a question whether more active and relaxing emetics might not be beneficially employed thus.

Chloroform as a relaxing agent, and also to secure a partial immunity from the agony of uterine contractions, has been so long and favorably used, and also been so ably discussed heretofore, as to require only a passing notice. In small doses it has seldom or never proved detrimental, but if given too freely is apt to cause a lessening or even a cessation of pains and thus prolong the labor beyond a normal duration. Given in short inhalations at the time of severest pains, it is one of the most valuable agents we have in securing easy parturition, and will not tend to produce post-partum hæmorrhage unless used after the uterus is emptied of the greater part of its contents, *i. e.*, during the third stage of labor; but as I have nothing new to offer regarding its use, I shall pass it without further consideration. Neither shall I discuss the ease which may be obtained by assuming different positions, but merely state that I allow my patients to assume any position they desire.

In some cases of prolonged labor, especially where the strength of the patient gives out and the pains cease altogether or recur only to produce suffering without assisting at propulsion, I have given a large hypodermic injection of morphine to temporarily check the labor and give the patient rest and sleep. This may last from one to several hours and when she awakes the pains will start with renewed vigor and the patient be in a much better condition to finish the accouchement.

In the later stages of labor cocaine has proved of the utmost service in lessening the pain from the intense pressure and stretching exerted upon the vagina, vulva, and perinæum. It should be introduced in 10-grain cocoa-butter suppositories, or the same quantity wrapped in a small pledget of cotton, about the time the head impinges upon the perineal tissues. As it slowly dissolves and spreads itself over the mucous membranes of the pelvic outlet, it produces an anæsthetic effect lasting about an hour, which almost entirely relieves the suffering usually undergone at this stage. If the labor be prolonged it may require the use of two or more of the suppositories to keep up the anæsthetic action. If there be a lack of the natural lubricating discharges, the cocoa-butter suppositories are best, otherwise the cocaine applied on cotton, or even on the ends of the fingers, answers every purpose and is more convenient. I have been told many times that the patient dreaded most the last, severe, expulsive pains and the immunity from suffering offered by this simple procedure has been very gratifying to both patient and physician.

A point regarding the ligature of the umbilical cord should be kept in mind, viz, after expulsion of the child more blood is being pumped into the babe than is returning to the mother, and the cord should not be tied until pulsation has nearly or entirely ceased, thus securing a greater supply of blood for the child and reducing the size of the placenta, making its expulsion easier and lessening the danger of flooding at this time.

After the delivery of the child I believe there is no necessity for delay in waiting for the placenta. If the massage or squeezing of the uterus through the abdominal walls be resorted to immediately, the secundines can be expressed entire, generally at the next recurring pain and without any traction whatever upon the cord. In fact, traction, as it is now universally conceded, delays delivery by presenting the flat surface of the placenta at the os-uteri instead of the edge of the rolled-up placenta, as nature will allow it to present if not meddled with; an increase of the *vis a tergo* is all that is required. This procedure also empties the uterus of all the clots and débris and leaves it in a condition for the continuance of gentle tonic contraction, and less liable to spasmodic contractions, which cause the much-dreaded after pains.

In securing and continuing a tonic contraction of the uterus after labor we not only get rid of many after pains, but by having the organ free from clots we secure a greater immunity from danger of sepsis and place the uterus in a better condition for natural involution. If the uterus from any cause remains large and flabby it is best to give small doses of ergot or viburnum four or five times daily for several days, or even weeks, to assist nature in reducing the size of the organ.

Speaking of ergot, it may be stated that its use in labor is becoming much restricted of late years. My individual opinion is that it often does as much harm as good, and produces much suffering by its cramping, spasmodic contractions, and that it often tends to contract only the middle or lower portion of the uterus, thus hindering rather than assisting expulsion.

In the majority of cases much easier and more natural pains can be produced by friction or massage of the abdomen above the uterus than by the use of ergot. Future experience will probably demonstrate that it is a superfluous and ofttimes dangerous drug, except in post-partum hæmorrhage, and that it seldom has any advantages in securing easy parturition. Quinine seems to be a better oxytocic, where one is needed, producing a more natural, intermittent contraction than ergot, but the general trend at present is to use as few medicines of this class in obstetrics as possible.

DISCUSSION.

Dr. CHESTNUT, of Philadelphia, Pa. I agree with the author as to the care to be exercised in securing the proper development and good health of young women previous to pregnancy. In regard to Dr. Saunier's views as to diet in pregnancy: any effort to reduce the bone-making constituents of the mother's blood is to be deprecated. Granting that it would be possible by such means to have a child born with soft bones, I think that it would be unjustifiable to do so, because the health of the mother would be injuriously affected and the welfare of the child jeopardized, and it is very problematic if any change in the mother's diet after her delivery would amply compensate the ill done to the child. In ordinary, normal cases the frequent douches and hot applications to the perineum and genitalia as recommended could rarely be had, and would be injurious as provoking congestions. As to massage and digital dilatation, it is to be remembered that intermittency is a physiological feature of labor that ought not to be interfered with. I think massage only properly applicable where there is uterine inertia, and that digital dilatation is objectionable, because it requires frequent examination and increases the likelihood of cervical lacerations. The final agony is better lessened by cautious use of anæsthetics than by any local means of obtunding sensibility. These, by destroying the sensibility without corresponding relaxation, make perineal lacerations more probable.

Dr. Gutierrez said he would like to know from Dr. Saunier, of Chicago, if he believes that during uterine contraction in the first period of labor any aid should with propriety be offered. His experience leads him to believe that labor terminates promptly when at first it has progressed slowly, and also inversely. On the other hand, art should be nature's humble follower; we should not hasten by untimely efforts when nature by its own unassisted power can accomplish its own designs.

Dr. Saunier, of Chicago, said in reply to Dr. Chestnut and others, that he had recommended this diet to mothers for twelve years and had not observed osteo-malacia or other evil results in the children. Replying to an interrogatory by Dr. Upshur, he said he had seen no toxic effect from the use of cocaine in the genital tract, nor had he observed that there was greater frequency of tears—he usually introduced a suppository containing 10 grains of cocaine.

Dr. Upshur had observed toothache or loss of teeth in women deprived of phosphates, etc.; relief from toothache being obtained by administering hypophosphates, etc.

Dr. Saunier had observed no ill effects on the teeth, etc., from the restricted diet.

THE MECHANISM OF LABOR.

By JACOB CHASE RUTHERFORD, M. D.

In October, 1890, I read a paper before the Vermont State Medical Society, in which I described the utero-vaginal angle, and demonstrated the fact that the ancient theories regarding the mechanism of labor were erroneous and misleading; that the accepted theory based upon the writings of Vesalius, Levret, Smellie, Naegle, and others, that the parturient canal is curved, the curve corresponding to the curve of the bony pelvis, is entirely groundless; that the parturient canal is not curved but angular, and that a knowledge of this fact should make a great difference in the manner of procedure in forceps deliveries. This paper was afterwards published in the American Journal of Obstetrics, and I shall quote largely from that paper, for my own studies, articles on the anatomy of the female pelvis, and recent advances in obstetrical surgery, as well as improvements in obstetrical forceps, strengthen the position I took nearly three years ago.

According to the older writers the parturient canal is curved, the axis corresponding with and being a continuation of the axis of the bony pelvis; Carus even going so far as to assert that a pair of compasses, with one leg placed on the symphysis pubis of a bisected pelvis, the other in the axis of the superior strait, would sweep around a circle one-half of which would represent the axis of the pelvis. Others modify this curve somewhat, and say that it is represented by the curve of an irregular parabola. The investigations of Fabbri, Sabbatier, Boissard, and Varnier show these theories to be incorrect; that the axis of the parturient canal, instead of being curved, is made up from two axes, i. e., the axis of the uterus and the axis of the vagina, crossing each other at an angle of about 95°. Parvin quotes Varnier as speaking of this angle as "the angle of entrance and exit," meaning the point where the child makes its exit from the axis of the uterus and enters the axis of the vagina.

How is this angle formed? The axis of the uterus at term is represented by a line drawn from a point midway between the umbilicus and the ensiform cartilage to the middle of the coccyx. The axis of the vagina is represented by a line drawn from the upper portion of the orifice of the vagina to the lower part of the third sacral vertebra. These lines cross at an angle of about 95°, at a point on the floor of the pelvis a little above (in the line of the uterine axis) the tip of the coccyx. The uterus and the vagina together form a muscular tube having a blind upper extremity, and bent on itself in such a way that it might be likened to the

elbow in a stovepipe. This bend forms the utero-vaginal angle, and performs, as we shall see, a very important part in the mechanism of labor. It is necessary, in order to have a proper understanding of the mechanism of rotation, to glance for a moment at the anatomy of the floor of the pelvis, which is composed of muscles, fascia, connective tissue, blood vessels, nerves, etc., and is in reality the bottom of the pelvic basin. The most important structure in the pelvic floor and the only one we will examine is the levator ani muscle which "arises in front from the posterior surface of the body and ramus of the pubes on the outer side of the symphysis, posteriorly from the inner surface of the spine of the ischium, and between these two points from the angle of division between the obturator and recto vesical layers of the pelvic fascia at their lowest part. The fibers pass downward to the middle line of the floor of the pelvis, and are inserted, the most posterior fibers into the sides of the apex of the coccyx, those placed more anteriorly unite with the muscle of the opposite side in a median fibrous raphé which extends between the coccyx and the margin of the anus. The middle fibers which form the larger portion of the muscle, are inserted into the sides of the rectum, blending with the fibers of the sphincter muscle, and the anterior fibers become blended with the longitudinal fibers of the vagina and with the external sphincter and transversus perinei muscles." It is reënforced by the other perineal muscles and by the strong pelvic fascia. It must readily be seen from this description of the origin and insertion of the muscle that when united with its fellow of the opposite side a horseshoe-shaped trough or gutter is made, and that the sides of this gutter, being smooth, would naturally tend to carry any object impinging on them to the lowest point of junction, which is in the median line; and as the bottom of this trough slopes anteriorly, the object would be carried on toward the vaginal orifice in exactly the same way that water runs off a roof into an eaves trough and thence to the ground. Bearing in mind that the axis of the uterus crosses the axis of the vagina at an angle of about 95°, let us consider the mechanism of labor, taking first the occipito-anterior positions. First, there is flexion; then the descent of the head through the pelvis in a straight line (following the line of the axis of the uterus) until it reaches the side of the trough at the floor of the pelvis; then it begins to rotate from the oblique diameter in which it started to the antero-posterior diameter. When the head reaches the bottom of the trough it has fully rotated—i. e., the occipito-frontal diameter of the head corresponds with the antero-posterior diameter of the pelvic trough, and, being at the extreme end of the uterine canal, can of course go no farther until extension begins. Why? The head, being at the lower extremity of the uterine canal can go no farther in that direction; but on the anterior side of this extremity is the vaginal canal, placed, as has already been stated, at an angle of about 95° with the uterine canal. In other words, the head is at the utero-vaginal angle, which it can pass only by extension, and that is accomplished in the following manner: The uterine contractions are constantly crowding the child down into the pelvic groove, the pressure being exerted through the spine to its junction with the head. The result of this crowding down must be that the head will be either extended or further flexed.

It can not be further flexed, because the chin already rests on the sternum; consequently it must be and is extended, and in this wise: The head is now in the hollow of the sacrum and fully flexed on the body; its progress is barred in every direction save one, viz, the opening into the vaginal canal. Pressure from above tends to force the occiput in that direction where there is least resistance; the head glides over the smooth surface of the sacrum and extension begins. This allows the body to descend a little, which pushes the occiput still farther into the vaginal canal, thereby increasing the extension. This process continuing, more and more of the head is forced around the angle, until the occiput emerges from the vaginal orifice under the pubes, when it is immediately followed by the forehead, nose, and chin. Meanwhile, a shoulder being forced down against the side of the groove causes the body to rotate, the shoulders are pushed around the angle,

the body is bent laterally, and the shoulders are delivered in precisely the same manner as the head was, i. e., by being bent around the angle and under the pubes. The hips follow the same course, and, being smaller, are easily forced through the now greatly dilated canal.

In occipito-posterior cases, when anterior rotation does not occur, labor is much more difficult—not, as we have been taught, because it takes the occiput so much longer to sweep over the perineum, but because it is extremely difficult for an already flexed head to be further flexed so that it may pass the utero-vaginal angle. The head in occipito-posterior positions, when it reaches the extremity of the uterine canal is flexed on the body, and as pressure is exerted through the spine in the same manner as in occipito-anterior positions, the tendency is to do one of two things; either to begin extension by crowding the face into the vaginal opening, thus converting it into a face presentation, or to still further flex the head on to the body. In the latter case it takes so long to turn the angle that the head is so molded by the pressure that the diameters are changed; the occipito-frontal being shortened and the suboccipito-bregmatic lengthened, so that it may be forced around the angle; and even then it is doubtful if it can be delivered unassisted. Finally the head passes the angle, the parietal protuberances emerge from the vaginal orifice under the pubes, followed by the forehead, nose, and chin; and, as the text-books say, "the head is extended over the perineum," while it in reality drops on the perineum simply of its own weight. At the same time the shoulders come down and are delivered as in anterior cases. In occipito-posterior cases the perineum is enormously distended, because the head can not be flexed to a right angle with the body, and an imperfectly bent object is being forced around the angle.

In face presentations, mento-anterior, there is extension, descent to the pelvic trough, rotation, and, in precisely the same manner as in occipito-anterior cases, the face is pushed into the vaginal canal and flexion begins. The face is forced farther and farther into the vagina, increasing the flexion until the chin emerges under the ubes, followed by the nose, forehead, and occiput. Meanwhile the body descends, rotates, and is delivered as in occiput cases.

In mento-posterior cases, when anterior rotation of the chin does not occur, there is extension, descent, rotation, and further progress is impossible. Why? Because the head is fully extended on the body, and when it reaches the extremity of the uterine canal it can not be further extended so as to allow it to pass the utero-vaginal angle. The body can not be bent backward sufficiently to allow the head to pass the angle, therefore labor is arrested, not because the neck is $1\frac{1}{2}$ inches long and the chord of the sacro-coccygeal curve is $4\frac{1}{2}$ inches long, nor because the sternum impinges on the sacral promontory, but it is arrested because a fully extended head can not be further extended, the child's head and body become virtually a solid, compact mass, yielding at no point, and further progress is impossible.

In breech cases the same forces are at work in the same manner as in head cases. The breech is forced straight down to the floor of the pelvis, rotation occurs, the hips are gradually forced around the utero-vaginal angle, the body is bent laterally, the shoulders rotate and pass the angle while the neck is bent, the head rotates, turns the angle by flexion, and the child is born. When the after-coming occiput rotates posteriorly the head may be delivered either by extension or by flexion, as the case may be. In either case the uterine contractions cause the head to glide over the smooth surface of the sacrum, the head and sacrum resembling for the time being a ball-and-socket joint. Further proof that the child passes through an angular instead of a circular canal is found in the fact that in breech cases, when the legs are extended over the abdomen labor is greatly delayed, for the reason that as the legs can not be bent laterally they act somewhat as a splint which increases the difficulty in delivering the child.

I shall not speak of the management of labor, as that remains unchanged; but several points have suggested themselves to my mind, to which I should like to direct your attention:

(1) In a forceps delivery, when the head is at the superior strait, we should make traction in the line of the axis of the uterus until the pelvic floor is reached, this being done by grasping the shank of the forceps with the left hand at the vaginal orifice, while the right grasps the end of the handles and lifts them up, thus making the right hand the power and the left hand the fulcrum, the child's head being the resistance, as described by Pajot. In this way no power is lost; while if we make traction in the direction of the curve of the sacrum power is lost, and the child's head will, to a certain extent, impinge on the pubes. As soon as the head reaches the utero-vaginal angle, traction should be made in the direction of the vaginal axis.

(2) The birth of a child through the anus (a most unfortunate and distressing accident that sometimes happens) proves that there is an angle in the canal, and that the uterine contractions were so strong that the head had not sufficient time to pass the angle, and was forced in a nearly straight line through the soft parts.

(3) The fact that when the head has reached the floor of the pelvis the pain increases in severity, the head advancing with a pain and receding upon its cessation, extending and flexing, gliding over the smooth sacrum, is evidence against the curved canal theory; for if the canal were circular there would be no arrest of progress, any more than there is in the rectum. The apparent curving of the vaginal canal is due simply to the distention of the perineum to adapt it to the contour of the child's head.

(4) When the head is about to emerge from the vaginal orifice, the lower part of the woman's abdomen is much more prominent than at any previous time, because the head and body are at right angles to each other, the head being extended or flexed, as the case may be, and if the case be occipito-anterior the child's face may be felt through the perineum.

Do the bones of the pelvis exert the influence on the mechanism of labor that they are credited with? This question may seem entirely uncalled for, but let us consider a moment. The pelvis is a bony ring supporting the trunk, and in turn supported by the legs. It is shaped to give strength and elasticity to the entire body, and to accommodate in the female the uterus and its appendages, the rectum and the bladder. That it exerts but a slight influence on the mechanism of labor is shown by the thickening of the interarticular fibro-cartilage and the movability of the pelvic articulations, so that when the child descends the bones may be separated a little, or, in other words, that they may to a certain extent be pushed out of the way. The hollow of the sacrum does not cause the head to advance toward the vaginal outlet, for the reason that the shape of the head corresponds to the shape of the anterior surface of the sacrum, and when the head reaches the floor of the pelvis it fits into the sacrum exactly as the head of the femur fits into the acetabulum; and the sacrum, like the acetabulum, furnishes a smooth socket in which the head moves, governed by the uterus above and the utero-vaginal angle below.

OBSTETRICAL OBSERVATIONS ON THE NEGROES OF SOUTH CAROLINA.

By P. GOURDIN DE SAUSSURE, of Charleston, S. C.

MR. PRESIDENT AND GENTLEMEN: We fear that at the conclusion of this paper you will say "the mountain labored and brought forth a mouse;" for really there is nothing new in the article, yet the figures are startling, and some of the facts can well provoke discussion.

Here, at the beginning, let us say we can not claim that all of the figures are correct, for when one is dealing with a race that has little or no idea of the value of a year or two, exactness is impossible. You must know this, the negro with us takes some public event or calamity, such as "the war," "the great fire of 1861," "the

cyclone," or "the earthquake" as a period from which he makes his calculations. This example will illustrate what we mean: "How old are you?" "When the war broke out," or "before freedom, I was a good big girl." Bearing this in mind, you will excuse us for giving a paper with the term "about." A word as to the field from which the observations have been made. The figures are from the reports of the board of health, stubs from the books of midwives, and the personal experience of eighteen years of practice, during which we were consecutively house physician and surgeon at the city hospital, city dispensary physician, and obstetrist to the lying-in wards at the city hospital, which has 150 beds.

From the beginning the negress differs from her white sister, for at birth her weight, according to 57 observations, is greater, being 7.50 pounds or 3,398 grammes (boys, 48 observations, 8.25 pounds or 3,740 grammes). This is nearly a pound heavier than the average for the white female infant. Her menstrual life begins earlier; we believe it to be about 13. In 33 cases, where the age was certainly fixed, we found 13.10 as the average. This is a full year earlier than Emmet's average menstrual age, which he found to be 14.28. A possible explanation of this is that early use makes early maturity, for in the class that we are dealing with there are but few girls of 12 who have not had sexual intercourse. We believe the child-bearing period to be longer; for though in 43 cases we found the average age at the menopause to be 48.6, we have delivered several women who claimed to be over 50, and in the midwives' books we found records of 3 cases confined in their fifty-third year. On these two points the following figures speak. The average age of 19 primiparæ was 18.2, and the average of 12 women, each of whom had borne 12 or more children, was 38.8.

As to the duration and quantity of the menstrual flow, 83 women gave an average of 4.2 as to time, with three changes of napkins each day. Several hundred women, questioned on the point of quantity, gave the same answer—three or four changes a day, but you must bear in mind that a negress will wear a napkin longer than a white woman, still the three or four are not saturated. As a race, the negro, with us is very free from menstrual disorders and amenorrhœas, dysmenorrhœas, and menorrhagias when found are due to anatomical defects or lesions, never to nervous causes. In eighteen years of practice we have seen but three negroes who had to go to bed during menstruation; they work when menstruating as if they were well. With them it is a physiological not pathological condition.

As to the fruitfulness of the negro, we would say that they are more so than the whites, for in 107 families we found an average of 6.8 children to each; 19 of the mothers were primipara, but 12 had 12 or more full-term children. The board of health reports show in a colored population of about 32,000, during thirteen years, 14,000 deliveries, compared with whites for the same time, in a population of about 24,000, 7,140; yet the ratio of twins stood 9.63 per 1,000 colored to 9.52 per 1,000 whites. But we must call your attention to this fact: Up to within the last five years the negroes did not care how large their families were; since then they show a tendency to skirk the responsibilities of paternity and maternity. What we have said in regard to menstruation refers to pregnancy. The negro considers it a physiological condition. During it her habits, occupation, and diet are the same as with the non-pregnant; consequently she is not troubled by the diseases of the gravis. In eighteen years we have not seen a case of hypermesis, icterus, or chorea amongst them; and it is worth recording that in all but one of the 10 cases of pregnancy with phthisis that we have seen, the disease has been arrested. During eighteen years we have seen 3 cases of extra uterine pregnancy. One of these was of the broad ligament variety, and was finally delivered in the eleventh month, through an ulcerated vaginal vault.

The one disease of pregnancy to which the negress seems liable is eclampsia, and it appears to be becoming more frequent; we have, though, never seen it come on after or during labor; always before, and not in the earlier, but latter months of

gestation. These are the figures from the board of health reports, and they speak to the point of eclampsia becoming more frequent. In the five years, 1878 to 1882, there were only 11 deaths, births can not be given; and in the ten years from 1883 to 1893 (exclusive), 11,074 pregnancies (colored), deaths from eclampsia, 51; 6,054 pregnancies (white), 19 deaths. Now, Lusk says it is reasonable to estimate that for every death there are two recoveries, and under this ruling we would have 151 cases in the 11,074 colored and 57 in the 6,054 white, which would give us 13.6 cases per 1,000 colored and 9.4 cases per 1,000 white, which is more frequent than Galaban and Kleinwacher estimate for Europe (1,500) and larger than Parvin's (1,300) for this country. We are unable to furnish an explanation for this; though, according to the Traube-Rosenstein theory, "a hydræmic condition of the blood" might be advanced, for the negro is becoming poorer each day, and this poverty means anæmia. The condition of the 6 cases that we have treated would bear this out.

As the negroes do not consider an abortion occurring before the fourth month, summoning neither midwife nor physician to what they (the patients) consider a mere trifle, it is hard to speak on this subject. Howsoever, in five years as dispensary physician we treated about 18,000 colored people; so we are in a position to say that abortions, criminal and non-criminal, are very frequent; much more so than in the whites, at least 3 to 1. The exact figures here are, out of 57 women closely questioned we found but 3 who had not aborted, and the other 54 had had 142 abortions between them. To the board of health there were reported in five years, 1888 to 1893, 251 abortions colored, 84 whites; but since no physician or midwife attends the earlier abortions no report is made of them, so these figures do not indicate the fearful loss of life. Of the causes of the abortions, we put first syphilis, from which we would say 70 per cent of the negroes of Charleston suffer either through inheritance or by acquisition. This is a most startling statement, but we are supported in it by nearly all of the ward physicians. The second cause is medicine taken for the purpose. This is a sample history: A girl misses one, two, or more periods; she becomes alarmed, purchases ergot, rue, tansy, pennyroyal, or some cathartic, takes it, and after a few days of pain and hæmorrhage passes a clot of blood and the abortion is over; septic infection rarely follows, and no one is the wiser. In eighteen years we have never known of a single case of mechanical interference, and of but one case of fever or peritonitis from drugs taken for the purpose of causing an abortion. Compare these figures and statements with your experience, and see how little liable to septic infection the negro is, in these cases at least.

Before speaking of labor we would call your attention to the following measurements, the average of 15 observations:

	Centimeter.	Inches.
Circumference of false pelvis	.925	35.71
Width between antero-superior spines	.267	10.53
Width at broadest part of pelvis	.298	11.80
Width across trochanters	.336	13.50
External conjugate	.214	8.55

Labor in the negro is a simple act; so much so that comparatively few of them are attended by physicians, and if it were not for the fact that the city furnishes medical attention to all who say that they are not able to pay for it, then we would see still fewer, for the midwife's charge is only $5 for a confinement and ten days' nursing. The labors are attended by these midwives who have absolutely no knowledge. They sit by the bed and wait, telling the patient to bear down. If the woman is not confined in six or eight hours, then they send for a dispensary physician. The midwife's whole knowledge consists in an ability to cut and tie the cord and to extract a retained or tardy placenta by having the patient blow into a

small bottle. Whether the presentation or position is right or wrong, she has no idea. In ten years we have been called nine times to transverse presentation, with hand and arm delivery. This confirms what we have said of the midwife's lack of knowledge. They rarely make an examination, it would be useless, for they know nothing of the relationship of the parts, and they give no medicines; though in the last four years we have found one or two of them administering ergot, but without knowledge of its effects. They have done it because the doctor did in some case that they (the midwives) saw, so they have kept the bottles and had them refilled.

The following description will answer for many thousands of cases. A patient calculates generally very accurately by the tenth lunar month and by four and one-half months after quickening that she will be confined at such and such a time; she engages a midwife to attend her, labor begins, the midwife is sent for; she makes the bed ready; that is, she places some old carpet, cotton bagging that has been used as a house cloth or door mat, on the edge of the bed; over this two or three or more soiled petticoats or dresses are laid, and then the patient lies down. If all goes well the labor is over in from one to two hours multiparæ; 8 to 10 hours primiparæ. Fifteen observations gave us an average duration of 6.9 hours in primiparæ. The cord is cut, and then in fifteen or twenty minutes if the placenta is not expelled a bottle is handed to the patient and she blows into it, and the afterbirth is generally pushed out of the vagina. In eighteen years we have been called to but two cases of retained placenta. The cord is never pulled on, nor is the placenta examined to see if the whole of it has been expelled. The genitals are then washed with a piece of old soiled rag dipped in warm water. The abdomen is bandaged tightly, the labor is over, and the room shut up closely; no ventilation allowed. Gentlemen, nine-tenths of the colored children born in Charleston are delivered in this way. No antiseptic precautions are taken, but then no examining finger is ever introduced. Once a day the genitals are washed off with dirty water and rags. The napkins (for which some piece of soiled clothing answers) are changed four or five times in the first twenty-four hours, then three or four, and by the third day twice. On the morning of the third day a dose of castor oil is invariably given. On the eighth day the woman is up, and out shortly afterwards. You will naturally conclude from the above description that puerperal fever rages, but these figures, which are taken from the board of health reports and are absolutely correct, speak for themselves. From 1880 to 1892 inclusive: Births, 12,254; stillbirths, 2,066; twins, 138; 14,358 deliveries, with but 57 deaths from puerperal fever. We include in this puerperal peritonitis and metritis, the deaths from which are separated from puerperal fever in the quoted reports. These figures are correct, and so far as deaths are concerned they represent very nearly all of the cases of puerperal infection. For the bane of the negro's life is fever, and whenever there is a rise of temperature a physician is sent for. If you will remember that the city furnishes medical attention free, then you will understand how quickly he is summoned; yet we have been called to but three cases of puerperal fever in thirteen years. These figures do not show all of the cases of pregnancy, for in the five years from 1888 to 1892 there were reported 251 cases of abortions and premature deliveries. These do not count births or stillbirths.

Gentlemen, unless you have seen it you can not conceive of the filth, dirt, and lack of ventilation in the lying-in room. The family cooks, eats, and sleeps, in fact lives in there. Old rags and soiled clothing are always used around and about the parturient woman. Carpets, rugs, and house cloths answer for India rubber and draw sheets. A wooden pail answers for a commode, and is used in common by the parturient woman and all of her children under 4 years of age during the day, and by the whole family at night; furthermore, the pail is not emptied immediately after use, but is left for hours. Incidentally we mention that the parturient woman uses it in bed for the first twenty-four hours; after that she gets up to urinate or stool. When the atmosphere gets too foul, it is disinfected by burning a piece of rag in the

room. Yet consider these figures: In something like 14,600 deliveries, births, stillbirths, premature labor, and abortions we found but 57 deaths from puerperal fever, and, as we have said before, these deaths represent nearly all of the cases of puerperal infection. In a practice of sixteen years, in five of which 25,000 patients were attended, we were called to but three cases of puerperal fever. The significance of those figures is this, that where no examinations are made septic infection is almost unknown. The autogenetic theory of puerperal fever falls to the ground. Foul atmosphere and filthy surroundings lose their terror, and the examining finger stands convicted of murder. Surely this is a strong plea for diagnosis of presentation, position, and condition by external manipulation. At the same time we must call your attention to this fact: The negro has little or no fear of parturition; she does not look on it as dangerous; it may be painful, but not dangerous; she has no nervous dread as to the outcome for herself or offspring; she expects to be up and out in a few days; if the child dies she will beget another; no elaborate preparations are made for parturition. During the nine months of her pregnancy she has lead her usual life, eating, sleeping, and living as if she were not with child, and now at the end of the nine months she proceeds to empty her uterus as she would her bladder or rectum; she is natural, not civilized.

To this paper we have attached a table giving the figures that we have read and some others pertaining to the subject.

I hesitated to read the paper, for though I have been collecting the data and making the observations since 1876, I had not intended to put them in form for a year or two. However, when your chairman asked for a voice from the South, I hurriedly wrote this, but really it is like a premature child, delivered before its time.

Comparison of births, stillbirths, and deaths from puerperal fever and eclampsia between black and white population of Charleston, S. C., for thirteen years ending December 31, 1892.

COLORED.

Population, about	32,000
Births	12,254
Stillbirths	2,066
Puerperal fever	54
Eclampsia	59
Deaths from all causes, exclusive of stillbirths, premature births, and abortions	18,181

WHITES.

Population	26,000
Births	6,619
Stillbirth	521
Puerperal fever	25
Eclampsia	23
Deaths from all causes	7,140

Death rate over birth rate, exclusive of stillbirths:

Colored	5,927
Whites	521

THE THERAPEUTIC APPLICATION OF CHLOROFORM IN LABOR.

By JOHN N. UPSHUR, M. D., Richmond, Va.

Professor of Materia Medica and Therapeutics in the Medical College of Virginia; Honorary Fellow of the Medical Society of West Virginia, etc.

Since the primeval curse fell upon our race and pain and anguish have been the invariable and dreaded accompaniment of man's entry into the world; to soothe woman's sorrows and conduct her safely through the crisis is an object worthy our highest effort and one to be sought for with commendable devotion.

To accomplish this end the administration of chloroform has become a routine practice and the consensus of opinion, from a very large number of obstetricians, is in favor of its safety when thus exhibited. Careful observation for many years has tended to make me question its utility in many cases, nay, to convince me that oftentimes it adds to the peril and prolongs the trial.

That loyal devotion to true obstetric science demands that chloroform in labor should be exhibited just as other therapeutic agents in the treatment of other maladies. We forget that delivery is not a pathologic function; that it becomes pathologic only when conditions arise which convert an eutocia into a dystocia or when the physical conformation of the pelvis is such as to prevent the accomplishment of natural delivery by mechanical obstruction from errors in the pelvic conformation, malposition of the child, or monstrosity. When labor has become pathologic in character and operative interference, manual or instrumental, is demanded with the dangers of exhaustion from prolonged agony or the addition of surgical shock the case passes to the domain of the surgeon, so far as the unquestioned exhibition of chloroform is concerned, just as an anæsthetic is demanded in any surgical procedure as a safeguard to life. Or where the condition of the mother is such that her life is imperiled by the supervention of convulsions from existence of any of the systemic conditions, which, predisposing to such complication, become active factors as soon as the stimulus of pain or the concentration of poison to the nervous system sets in motion the morbid phenomina, which manifest themselves by an outward explosion, jeopardizing the life of the infant and of the mother.

It is not with conditions such as these that I purpose dealing, but with chloroform therapeutically applied as a causative factor, either predisposing or active, in transforming this physiologic function into a condition of some form of dystocia, making aid or interference necessary to the safe delivery of the woman.

The question, therefore, resolves itself into this problem: In what cases should chloroform be administered; at what stage of labor; what dangers arise in consequence; at what stage do these complications arise; the best means of combating them; and finally, these propositions being true, is it justifiable to administer chloroform in natural labor progressing with satisfactory rapidity?

To satisfactorily deal with these queries we must discuss the physiologic action of chloroform so far as it bears upon this question. In the first stage of the administration of chloroform we have its stimulant effect. The second is the stage of narcosis. In the third stage the functions of the spinal chord are abolished, as are those of the brain; this is the surgical stage. And in the fourth we have the condition of complete paralysis, death, usually by overpowering the respiratory center first. The modes of death are from reflex irritation of the cardiac ganglia; from epileptiform syncope in the stage of stimulation; from paralysis of respiration; from paralysis of the heart, and finally from depression by the chloroform narcosis and shock. Chloroform diminishes the excitability of the muscular system and its capacity for work; if prolonged, exhausts muscular irritability. It interferes with oxidation of the blood, and thus becomes toxic to the fœtus. Its stimulant action on the vasomotor center is doubtful.

Now, as a practical deduction from these facts as to the action of chloroform, let us apply them to a solution of the queries as enunciated before. As to suitable

cases for the administration we need not consume time in discussing. Every skillful and experienced obstetrician will point to those cases in which the pains are nagging and exhausting; in rigid os, in great nervousness, and in restlessness. I think, too, that except as just stated it should not be administered until the second stage of labor is well established and at the latter part of that stage, and withdrawn so soon as the occiput has passed the ostium vaginæ.

The most serious question is as to the dangers arising from the exhibition of chloroform in labor, and it is with this question I would deal with greatest emphasis. Note the danger from reflex irritability, with incomplete anæsthesia. It is at least worthy of investigation that if the fatal influence of chloroform does not manifest itself here, still its effect on the heart through the cardiac ganglia may be potent enough to at least predispose to hæmorrhage or to weakened heart action during convalescence, with the condition of debility consequent upon it. But the obstetric stage is the beginning of narcosis; it is difficult to keep the patient at this point. Lack of appreciation of what is going on interferes with voluntary assistance. One of its physiologic effects is to diminish muscular excitability, to interfere with muscular capacity for work; pains are consequently less potent and effective in expelling the child; there is much greater muscular tire, and the natural consequence that when the second stage is complete danger of hæmorrhage is much greater from incomplete condensation of the uterus, and I have often seen it occur. The uterus is left in such condition as to make subinvolution, with all the ills that follow in its train, almost inevitable.

The spongy condition of the womb makes the patient much more liable to septic infection. Not only so, but often have I seen labor suspended nor on the withdrawal of the chloroform did the uterine pains return with desirable efficiency. Evidently its effect on the uterine muscle was toxic in character, and instrumental delivery became a necessity, the agent having transformed a simple physiologic process into a pathologic one, thus adding to the peril of the mother. The interference with oxidation of the blood endangers the life of the child, and I make bold to assert my belief that its use in natural labor increases the percentage of stillbirths. Nor are these the most serious risks. Though few deaths have been reported from chloroform in obstetric practice, it is a question if death supervening in many cases within twenty-four hours after delivery and reported as heart-clot, etc., may not have been due to the depression from long-continued administration of chloroform, plus the shock of labor? In the cases where uterine contraction is not interfered with, and the woman holds her breath, fixing the chest wall to more efficiently bear down, she is put in a most favorable condition for the occurrence of epileptiform syncope when chloroform is being administered, and the retention of carbonized blood in the brain may under such conditions overwhelm the nervous system. The dangers from chloroform exhibition are most likely to manifest themselves, however, at the close of the second or during the third stage of labor, and here postpartum or accidental hæmorrhage is the most important and may be the focus from which may radiate other serious evils.

I would lay down the proposition as an axiom, that whenever chloroform has been administered a full dose of ergot should be given so soon as the head is delivered or the second stage of labor completed. I have never regretted giving the ergot, and remember no case in which it was omitted that I did not repent of the delinquency. I would also suggest that it is safe practice to give a full dose of quinin (gr. x) at the beginning of the second stage of labor when chloroform is to be exhibited, or belladonna, or one or more doses of nitroglycerin; especially will this last tend to antidote the nausea following chloroform administration. The hypodermic injection of atropin (gr. 1/120) or sulphate strychnin (gr. 1/60) will undoubtedly add to the safety of the patient. We must not lose sight of the fact that in the obstetric use of chloroform (which is usually conceded as the safest field for the use of chloroform) the patient is much longer under the influence of the anæs-

thetic, and that the stimulus of constantly recurring uterine contractions of a painful character, which are supposed to antidote the ill effects of the chloroform by constantly arousing the patient, may be absent or fail to exercise the stimulant effect usually a consequence of pain.

In the light of the foregoing facts I most earnestly avow my belief that we, as physicians, should place chloroform upon the same platform as other drugs, and not be influenced by our sympathies aroused by the pleadings of patients or the fashionable routine practice of the day, but initiate and sustain a much needed reform in our obstetric work, chloroform being administered, as other agents, when the indications in the case imperatively demand it; not unless. He is a bold man who, invading the domain of nature, interferes with her physiologic processes and places the wife and mother in a position of increased peril, and perchance in the shadow of a fatal issue, or at least of a life of invalidism and suffering, where before the home was irradiated with the effulgent rays of the sunlight of true and unalloyed happiness.

COMPRESIÓN UTERINA.

Por JOSÉ MARÍA DE YTA,

Médico Director de la Casa de Maternidad de Puebla (México), con motivo del Primer Congreso Pan-Americano en Washington.

El mecanismo del parto fisiológico, el conocimiento exacto de esa serie de movimientos que el útero obliga á hacer al producto para expulsarle del recinto materno, es la clave del arte de la tocología. Sin ese conocimiento nuestro modo de proceder sería incierto; lanzados en lo desconocido, sin brújula ni timón, surcaríamos mares ignorados y encallaríamos á cada paso, haciendo presas del ciego empirismo á las infelices mujeres que pusiesen su suerte y la de sus hijos en nuestras manos.

El estudio de la forma del producto, la del canal que este debe recorrer, y el de las fuerzas expulsivas, son puntos capitales de mira, tratándose ya sea del parto entócico, ya del distócico.

Tanto en la pelvis como en el producto se han considerado varias líneas, convencionalmente llamadas diámetros, que tienen que ponerse en relaciones recíprocas fijas é invariables en cada presentación y posición.

Los diámetros longitudinales de la cabeza (occipito-frontal, occipito-bregmático) y los transversos del tronco (bis-acromial, bis-ilíaco), descienden en dirección de los diámetros oblicuos del canal y salen en la de los longitudinales; la conformación misma de la pelvis explica el por qué de este mecanismo; los diámetros oblicuos del estrecho superior son los mayores, mientras que en su estrecho inferior el antero-posterior ofrece mayor longitud gracias á la retrocesión del coxis.

Otro de los requisitos es que las regiones posterior ó anterior del cuello del feto se ponga en exacta y simétrica relación con la pared anterior del canal, cuya circunstancia sóla realiza el acortamiento de los diámetros longitudinales de la cabeza, y facilita por tanto su salida. Cuando este requisito no se verifica, el parto es difícil, peligroso y aún imposible á veces.

Estos movimientos se verifican en virtud de las contracciones uterinas eficazmente auxiliadas por la acción de los músculos longitudinales abdominales. De estos motores el más importante es el primero, que basta para la realización del parto; el segundo, sin embargo, es un útil adyuvante.

El útero desarrollado es un músculo liso subordinado al gran simpático y recibe además algunos ramos sensitivos del plexus sacro. El punto de partida de esos nervios, según los trabajos acabados de Frankenhäuser, es el ganglio cervical, que en las mujeres embarazadas está constituido por un plexus de dos pulgadas de longitud y de pulgada y media de altura; se encuentra á lo largo de la pared posterior

de la vagina, y á su formación concurren los dos plexus hipogástricos, los tres primeros ganglios del simpático y el segundo, tercero y cuarto nervios sacros. Según dicho autor, este ganglio cervical da nervios muy numerosos á todo el útero, y en particular al cuello.

Habiendo estudiado Luska la disposición de las fibras musculares en una mujer recien parida, notó tres planos colocados de la manera siguiente: La capa superficial muy delgada está formada por un estratum continuo que cubre el útero como un capuchón y cuyos hacesillos se prolongan sobre las trompas, los ligamentos redondos y los ligamentos del ovario. Las crestas laterales del útero no estan cubiertas por esta capa. La capa media, que forma la sustancia gruesa muscular del útero, presenta un tejido muy complicado atravesado por una malla de anchas venas, cuyo enlace resulta de un completo intrincamiento de los hacesillos transversos y longitudinales. Los primeros tienen un trayecto sinuoso, ya penetren profundamente, ya se hagan superficiales. Los segundos provienen en parte de las fibras trasversas que cambian de dirección y en parte son autónomas. La capa muscular interna, situada debajo de la mucosa, forma anillos concéntricos al rededor de los tres orificios del útero, las dos trompas y el orificio de la matriz.

Una vez bosquejada la parte anatómica, pasaremos á la fisiología del órgano. ¿Cuales son desde luego las causas del parto? En general se han buscado en tres circunstancias: Primera, en la compresión ejercida por la parte presentada sobre el cuello (Petit); segunda, en la distención exagerada del útero (Maurican); tercera, en la congestión menstrual (Osiander). Scanzoni combina las dos últimas causas para explicar el fenómeno.

Pero á Simpson se debe la explicación mas precisa; atribuye la causa del parto á la irritación de las fibras nerviosas terminales, debida á la falta de relación entre las paredes del huevo y el útero; las primeras sufriendo una degeneración grasosa en los últimos meses del embarazo hacen que el huevo, cuerpo extraño, estimulus, despierte por acción refleja contracciones expulsivas; una vez comenzado el trabajo las relaciones tienen que irse perdiendo más y más por el descenso del producto, y por la contracción de las fibras musculares; en una palabra, la marcha del trabajo está en relación directa y constante con la energía y frecuencia de las fuerzas expulsivas, produciendo estas la pérdida de esas relaciones entre madre é hijo.

Efectuándose la contracción de una manera uniforme en todo el globo uterino, trae un aumento de tensión en su contenido. Pero si es cierto que todo el órgano entra en acción, no es menos positivo que hay también una *pars minoris resistentia* donde terminan la mayor parte de esas fuerzas, este lugar es el cuello; sujeto á estiramientos á cada contracción por la acción de las fibras longitudinales, y no contando con la capa muscular media, tiene que irse dilatando paulatinamente.

El útero puede considerarse dividido así: Segmento superior, cuerpo y segmento inferior; los dos primeros por su mayor potencia muscular obran de una manera puramente activa; el segmento inferior representa otro papel diverso, al principio del trabajo obra como un antagonista de los otros, regulariza y modera la marcha y da lugar á que el canal sufra modificaciones en su consistencia; en seguida, dilatado ya el orificio, facilita los movimientos de acomodación, y estrechándose sobre la parte presentada se convierte en una verdadera hilera por la que ha de pasar el producto, amoldándose matemáticamente al calibre de ese orificio.

La compresión que el cuello ejerce sobre la parte presentada puede manifestarse claramente; si se practica el tacto en ese momento se encuentra, suponiendo la presentación de vértice, el plegamiento del cuero cabelludo y el cabalgamiento de los huesos.

Antes de terminar lo relativo al útero, réstame decir algo importante relativo á su función. La fibra muscular de la matriz es contráctil; esta propiedad se manifiesta de dos modos: Uno intermitente y doloroso, contractilidad orgánica, y otro lento, graduado, indoloro y más ó menos continuo, contractilidad de tejido ó retractilidad. A la contractilidad está encargada la expulsión del feto, á la retractilidad el evitar

el desalojamiento, y después del parto despegar los anexos y evitar las hemorragias. La relación que existe entre ambas fuerzas no está siempre en razón directa; muchas veces la matriz se contrae perfectamente durante el trabajo, y se retrae mal; otras después de haber sido muy perezosas las contracciones, vuelve muy bien sobre sí cuando el producto ha sido expulsado ó extraido.

Réstame hablar de otras fuerzas auxiliares á la primera, es decir, de la contracción de los músculos abdominales y del diafragma. Cada uno tiene su acción especial; así, los primeros, colocados como una cincha al rededor del útero, le sirven por una parte de apoyo en el momento de la contracción, y por otra hacen que el eje uterino y del feto se identifiquen con el pelviano, condición indispensable del parto. La comprobación de este axioma se halla en los casos de desviación uterina. Contraidos los músculos abdominales y el diafragma con tonicidad fisiológica ejercen una presión regular, total, sobre el vientre, parcial y mediata sobre el útero.

He aquí los agentes de la naturaleza y su fisiología, encaminados á la expulsión del producto. Solo los he enunciado. ¿Son suficientes por sí solos, desempeñarán en todo caso tan importante función? Perentoriamente no. Me explicaré; los elementos que deben ser tenidos en cuenta son: La potencia, la resistencia, y como consecuencia, la resultante. Algunas veces las fuerzas contractiles no tienen toda la energía necesaria (inercia del útero), otras siendo suficientes chocan contra un obstáculo insuperable (desviaciones de la matriz, situaciones anómalas, complicadas, irregulares del producto y vicios de conformación del canal ó del feto). En todos esos casos hay dificultad en el parto.

Pasaré á estudiar los medios clásicos propuestos para suplir las fuerzas del organismo. Hay inercia uterina; investíguese la causa. Se combate ora reanimando las fuerzas de la enferma, sosteniendo su moral; ora apelando á los vómitivos, purgantes, narcóticos; ora empleando los ocitócicos (cuernecillo de Centeno, zihualpatle, etc.); no basta esto; dilátese ó desbrídese el cuello según la urgencia y hágase el parto artificial.

Hay un obstáculo en la pelvis—depende de las partes blandas ó de las huesosas; si de las primeras, evácuense el recto y la vagina, desbrídense las cicatrices, extírpense los tumores, divídase la vulva ó el cuello uterino, punciónese la vejiga, etc., no es bastante—parto artificial.

Si la dificultad está en el esqueleto, según el grado de su estrechez, aplíquese el forceps, practíquese la versión interna, la embriotomia ó la operación cesárea.

Lo mismo es aplicable cuando el obstáculo proviene del producto; según sea vencible ó invencible se remediará, bien por una simple aplicación del forceps ó por la versión, embriotomia, cefalotripcia ú operación cesárea.

La inercia uterina se marca después del parto impidiendo la expulsión placentaria; estimúlense las paredes uterinas con fricciones sobre las paredes del vientre, rósiese con eter, etc.; hay hemorragia, extráigase la placenta; hay hemorragia secundaria interna, extráiganse los coágulos.

Estos son, en resúmen, los diversos medios que se recomiendan, pero de entre ellos deseo llamar la atención sobre algunos, estudiando su aplicación y sus resultados desastrosos, ya para la madre, ya para el producto, para que se puedan valuar las ventajas científicas y prácticas de la maniobra que hace el objeto de este trabajo.

En los casos de inercia uterina, hallándose rota la fuente, se recomiendan los ocitócicos, pero la experiencia ha enseñado que su empleo es peligrosísimo en un gran número de casos, al grado que cada día se va arraigando más y más en la mente de los prácticos la idea de desecharles. Los tónicos y los baños tibios vienen en seguida, mas sus efectos ni son suficientes ni violentos. Agotados los medios médicos, los quirúrgicos se imponen, la indicación del parto artificial es clara. Para realizarle se expone muchas veces á la madre á traumatismos más ó menos considerables.

La aplicación del forceps presenta las siguientes desventajas que solo apuntaré: El traumatismo propio de toda maniobra interna; segunda, las grandes tracciones

necesarias al movimiento de extensión de la cabeza, el cual se dificulta por la conformación especial de la pelvis mexicana, cuya pared anterior rinde siempre más de cuatro centímetros y medio, siendo así que la longitud del cuello del niño solo tiene tres ó tres y medio, de donde se sigue que para efectuar el movimiento de báscula es necesario que los hombros bajen, en cuya tarea aquel es estirado á un grado que muchas veces cede en perjuicio del producto.

Salida una vez la cabeza para hacer salir el tronco cuando falta ó son insuficientes las contracciones uterinas por diminución del contenido, se recomienda tirar de la cabeza y á la vez se le imprime un movimiento de rotación que comunicándose á los hombros les ponga en dirección del diámetro oblicuo correspondiente á la pelvis. No es raro que esta maniobra irracional sea insuficiente, por lo que se aconseja introducir la mano entre la cabeza ó la pared útero-vaginal para enganchar y bajar la axila posterior. Esto fácil es decirlo, pero no hacerlo, y no sólo trae gran dificultad la manipulación, sino que las consecuencias pueden ser desastrosas para la madre (traumatismos considerables, desgarramiento del perineo) y para el producto (luxación del cuello ó del hombro, asfixia consecutiva).

En los casos en que habiendo salido el tronco quede la cabeza, para efectuar la extracción de esta se recomienda levantar con una mano el feto hacia el vientre materno, mientras que con la otra se engancha el cuello del producto y se tira fuertemente (maniobra de Praga), ó llevar la palma de la mano y la pared útero-vaginal, apoyarse en la mandíbula inferior ó hacia los lados de la nariz y tirar, ó llevarla, por último, hasta el occipital, efectuando la flexión de la cabeza (método del Sr. Rodríguez) ó aplicar el forceps con la propia mira, en cuya maniobra se pierde un tiempo preciosísimo.

Se presentan ocasiones en que el perineo es el único obstáculo á la marcha regular del alumbramiento y la aplicación del forceps parece que salva la dificultad; pero graves cargos se puede hacer al método en muchos casos; pretender ejecutar por la fuerza lo que debe hacerse con suavidad, forzar un camino que no está preparado, querer recorrerle de prisa cuando está mandado ir paso á paso, paulatinamente y de un modo gradual, como cuando nos ponemos un guante nuevo, es peligrosísimo, sobre todo, en casos de parto en posiciones posteriores directas.

Los peligros de la extracción manual de la placenta ó de los coágulos en la hemorragia interna son los inherentes á toda maniobra dentro de la cavidad del útero. Mas hay otros recursos, como se va á ver en seguida.

La compresión uterina, introducida y puesta en práctica entre nosotros por el Sr. Profesor Rodríguez, es una maniobra muy interesante. Los antiguos apenas se ocupaban de ella llamandolo "expresión uterina."

Kristeller fué el primero que preconizó la compresión para hacer salir al producto; antes solo se empleaba para hacer salir la placenta.

Algunos parteros anteriores á Kristeller señalan la compresión como un buen recurso para acelerar el parto. Así el árabe Albucasis, á propósito de los partos naturales dice: "Cum ergo vides ista signatura oportet ut comprimatur uterus ejus, ut descendat embryon velociter," y Rodrigo de Castro, en 1549, aconseja á las parteras compriman el vientre para ayudar la expulsión del producto. Ambrosio Paré aconseja también este medio en estos términos: "La partera debe comprimir las partes superiores del vientre y empujar al niño hacia abajo." Los antiguos prácticos mexicanos se ayudaban de la compresión uterina, y con tal motivo empleaban á los tenedores; colocada la puerpera en la silla de trabajo, mientras el partero vigilaba la marcha del parto, un ayudante, enclavijadas las manos, estaba encargado de comprimir con ellas el fondo del útero y empujar hacia abajo.

El destino de la compresión se manifiesta claramente. Estando ya dilatado el cuello uterino y la cabeza introducida en la escavación basta comprimir el fondo de la matriz con una mano y hacer con la otra el tacto vaginal para notar que la región abocada desciende bien y con cierta fuerza hacia el piso perineal; cada vez que cesa dicha maniobra, en lugar de bajar sube la región presentada.

El esfuerzo no tiene que ser mucho; según Poppele, se requiere solo una fuerza de 4 libras para romper la membranas en un parto difícil. El Dr. Matthew Duncan concluye de experiencias semejantes que la fuerza desplegada para romper las membranas es de 6 libras, y que 16, por término medio, bastan para el parto. Es inútil decir que la presentación ha de ser normal y la pelvis proporcionada al producto. Kristeller, en un parto por la extremidad pelviana, en que el producto se asfixiaba, por medio de la compresión obtuvo el desprendimiento completo en dos minutos.

La compresión uterina es un verdadero auxiliar de la potencia contractil del útero; si esta falta la suple.

La práctica justifica estos asertos, y los médicos que me acompañan en las operaciones del establecimiento de mi cargo son testigos que muchas veces, salida la cabeza del niño, la compresión sobre el útero ha expulsado el tronco acompasadamente, observándose los admirables movimientos que fisiológicamente efectua el producto al salir del vientre materno.

MANERA DE PRACTICAR LA MANIOBRA.

Acostada la puerpera sobre el dorso, se coloca el operador á uno de sus lados; extiende sus manos sobre el vientre y procura, aislando antes la matriz, la aplicación más perfecta posible de la pared abdominal y de la uterina; sin levantar las manos, ya extendidas, se aproximan los dos pulgares como para tomar un punto de apoyo, y rodeando el fondo del útero se ejerce sobre él una presión conveniente; se comienza por ligeras presiones y luego se aumentan proporcionalmente, ejerciéndolas de arriba abajo, de una manera gradual, durante algunos segundos, y se continua imitando en todo el ritmo de las contracciones uterinas; á veces es indispensable hacer continua la presión para terminar presto un parto peligroso por complicaciones sérias. Cuando el partero no tiene cerca de sí un ayudante que haga la compresión la hace solo, según el siguiente procedimiento: Con la mano y antebrazo correspondiente rodea el fondo del útero, que comprime, y con la opuesta sostiene el perineo.

Ya he dicho que la compresión uterina de una manera general podía suplir ó ayudar á la fuerza contractil del útero en muchos casos, y anunciado sus ventajas comparándola con los respectivos medios clínicos; me ocuparé ahora de particulizar sus indicaciones.

Inercia uterina.—Esta constituye un obstáculo serio para el alumbramiento y habiendo demostrado que los medios médicos empleados para combatirla pueden ser insuficientes, y que la aplicación de instrumentos ó de maniobras internas es peligrosísimo, la indicación de la compresión uterina es capital.

Aplicación de forceps.—Empleando la maniobra que recomiendo el operador hace menos esfuerzos para sacar el producto, y por consiguiente, puede regular más bien su fuerza y hacerla mas provechosa; los hombros se acomodan y no son necesarias para su salida tracciones que podrían ocasionar traumatismos considerables.

Expulsión del tronco, estando la cabeza fuera del canal.—Recordando los medios clásicos recomendados y sus inconvenientes hacemos una elección razonada de la compresión uterina; expulsa al diámetro bis acromial fácilmente sin exponer á las luxaciones y fracturas de esa región, ni á las desgarraduras del perineo.

Expulsión de la cabeza, siendo esta el único obstáculo para la terminación del parto.—Aquí la compresión uterina tiene varios destinos que solo apuntaré: Primero, suple á la falta de retractilidad haciendo que las manos sigan al útero en su decenso, y logra por consiguiente que la cabeza permanezca doblada, condición *sine qua non* de su salida fisiológica; segundo, colocada la pared posterior del cuello del niño en relación con la sínfisis pubiana, comprimiendo con la palma de la mano al occipital, se logra también que la barba recorra la curva sacro-perineal; en casos excepcionales, de no ser bastante lo anterior, se empleará el procedimiento peculiar al Sr. D. Juan M. Rodríguez, á saber: Se desliza la mano izquierda por el plano external del feto, y tomando punto de apoyo seguro en el occipital (y no en la barba ó

los pómulos como han aconsejado todos los autores), se tira de él levantando al mismo tiempo al producto sobre el vientre de la madre.

Resistencia del perineo.—Para vencerle sin peligro de ruptura se necesita de una potencia suave, lenta y graduada; la compresión llena perfectamente este programa.

Como simple recuerdo indicaré el empleo de la compresión cuando la cabeza situada en el estrecho superior necesita de gran fijeza para la aplicación conveniente del forceps.

Aducir con extensión las pruebas clínicas de mis afirmaciones, era mi deseo, y su realización hubiera sido fácil por tener numeroso materiale; pero la premura del tiempo y el temor de hacerme difuso me hacen únicamente manifestar que sin ocurrir á números, durante catorce años de práctica civil y cerca de diez años de práctica hospitalaria encargado de la dirección de la Casa de Maternidad, he podido ver comprobados todos mis asertos.

RESÚMEN.

La compresión uterina es una preciosa maniobra que tiene por objeto suplir la falta de tonicidad de las paredes abdominales y las contracciones del útero.

Está indicada:

(1) En los casos de inercia de la matriz.

(2) Para ayudar á las tracciones hechas por el forceps.

(3) Para expulsar al tronco, salida ó extraida la cabeza; en este caso se evita tirar de esta ó enganchar la axila para sacar el resto.

(4) Para mantener doblada la cabeza después de la expulsión del tronco y ayudar á la extracción de aquella en el parto manual.

(5) Para vencer la resistencia del perineo y evitar la aplicación del forceps.

(6) Para fijar la cabeza en el estrecho superior en los casos de aplicación de forceps ó de cefalotripsia.

(7) Para facilitar la salida de la placenta.

(8 y último) Para expulsar los coágulos reunidos en el útero, en los casos de hemorragia interna.

NOTA SOBRE LA EXPRESIÓN DE LA VEJIGA EN LA RETENCIÓN DE ORINA POST PARTUM.

Por el Dr. SEBASTIAN CUERVO SERRANO.

Sr. Presidente y Respetables Comprofesores: Los ligeros apuntes que presento, simples notas recogidas en mi práctica, debieran constituir un trabajo de otra forma, que lo hiciera digno de aparecer ante la respetabilidad del Congreso Médico Pan-Americano; se refieren á un estudio que hay poco tiempo inició sobre el tratamiento de la retención urinaria en el puerperio. Por el caracter práctico del asunto me resolví á ofrecerlo á la consideración de esta asamblea sin pretensiones de prioridad, siquiera puedan servir como invitación á mis sabios comprofesores para cooperar al fin que me propongo.

La retención urinaria consecutiva al parto distócico parece estar en relación directa con el grado y tiempo de compresión que haya ejercido el feto contra la sínfisis pubiana, compresión que puede llegar á mortificar los tejidos, determinando la fístula vesico-vaginal. Al forceps, en mi concepto, no debe atribuirse en tales casos influencia para determinar la retención, porque generalmente se recurre á él cuando ya existe la verdadera causa.

Esta complicación merece atenderse seriamente por las molestias que produce á la paciente, y porque el cateterismo, también molesto, expone por lo general á afeccio-

nes consecutivas que á su vez exigen un tratamiento *ad hoc*. La necesidad de emplear la sonda ocasiona con frecuencia la cistitis; supone, por lo menos, tantos ratos desagradables para la mujer, cuantas veces, á su pesar, tenga que prestarse á este procedimiento.

Juzgo que la retención urinaria de que me ocupo depende de una paresia vesical por compresión. En tales casos, prescindo del cateterismo y determino la contracción de la vejiga con la compresión bimanual, verdadera expresión, análoga á la que se ejerce sobre el útero para la expulsión de la placenta, según el método de Crœdé.

Acostada la paciente sobre el dorso, con los muslos en semiflexión, trato de aprisionar entre mis manos la vejiga, teniendo cuidado de retener el fondo con mis dos pulgares sobrepuestos; hundo los bordes cubitales en el vientre al mismo tiempo que aproximo las extremidades carpianas, oponiendo así un obstáculo á la dilatación que tiende á verificarse hacia el fondo; aproximo las palmas de las manos gradual, pero resueltamente, y entonces la mujer siente una pequeña molestia que cesa en seguida con la emisión de la orina. Á medida que disminuye el volumen de la vejiga aumento la presión que llevo hasta hundir los dedos por detrás de la sínfisis Una sensación de completo bienestar es la consecuencia inmediata.

La operación debe repetirse cada vez que se haga imperiosa la necesidad de orinar, pero basta practicarla cada doce horas; por lo general del tercero al cuarto día se restablece el curso.

Diez y ocho casos tengo anotados, y en el último no obtuve éxito; fué necesario el cateterismo. Atribuí á la obesidad la verdadera causa del fracaso, pero se trataba de un tumor pelviano que dificultó notablemente la extracción del feto aún después de la cefalotripsia, también dificultada por la misma causa. Dicho tumor, inflamado y rodeado de tejidos tumefactos, oponía un notable obstáculo al paso de la orina.

El primer caso en que practiqué la expresión se refiere á una joven, primipara como la última, y también obesa; había notable edema vulvar; la emisión se verificó con facilidad por el procedimiento descrito, restableciéndose el curso al tercer día.

La índole de este escrito me obliga á terminar y lo hago creyendo que la expresión debe preferirse al cateterismo por estar exenta de las molestias é inconvenientes de este.

Insistiré en este estudio que sólo tengo iniciado.

Envío mis entusiastas aplausos como testimonio de admiración á los iniciadores y organizadores del Congreso Médico Pan-Americano.

REMARKS ON THE CARE AND HANDLING OF THE CHILD AFTER DELIVERY.

By Dr. FLORENCE DONOHUE, of the District of Columbia.

MR. PRESIDENT: I desire to say a few words, in passing, upon a subject, trifling in itself, but to which I attach some little importance, and that is the care and handling of the child after delivery.

It not infrequently occurs that immediately after expulsion the child is seized by the midwife, or other attendant, and carried with a sudden and rapid movement toward the foot of the bed, and this usually regardless of the amount or length of cord exhibited. Should there not be sufficient cord presented to admit of this sudden and extended removal of the child from the maternal parts, the traction upon the umbilicus produces tumefaction at that point closely resembling and not much less serious than congenital umbilical hernia. Laceration at the bond of union between the funis and umbilicus will sometimes take place under these circumstances and we have a somewhat serious condition of things in this regard

to start with. To prevent or avoid this the child should not be removed but the slightest distance from the mother and the cord should be perfectly loose. Cutting of the cord should not take place until pulsation has ceased or nearly ceased; because at this time nature is supplying the child with blood from the mother through the medium of the cord and therefore it will be readily understood why the severing of the little one from its source of supplies should not take place too soon. I am confident that the majority of babies who die of inanition owe their death to the untimely severing of the connection and to having been sent adrift without a sufficient quantity of blood.

Washing should never be permitted to take place until life and a likelihood to live has been firmly established and then should be done exposing only a portion of the body at one time. The head should be the last part to be washed, the balance of the body being well and warmly wrapped up, and as little time should be spent in the washing as possible, always consistent with doing it properly. It should never be lost sight of that the little stranger came from a warm climate and that it would be bad policy to keep it too long exposed to the inclemency of a cold world. I have known several cases of pneumonia and death to occur from too long exposure in washing the child and combing its hair. As a matter of course, the room should be warm, and no draft whatever should be permitted to strike the baby.

I have learned in my practice and experience that babies and very young children suffer terribly from thirst, and that most of their fevers and the principal cause of their restlessness is want of water. I direct all my lady patients with young children to give them water frequently. The children seem to want it, they drink it with a relish, appear grateful for it, and the results are satisfactory. I was called recently to see a child who, the mother said, had "inward fever." I examined the child, and found its lips parched, and its tongue dry and feverish, and I called for some water to moisten its mouth; the child, young as it was, clutched the saucer containing the water in both little hands and commenced to drink, and stopped when it had enough. That was all the medicine the child needed and the "inward fever" was abated. I told the mother to offer the child water whenever she thought it might be thirsty, and she has followed my advice with good results. I tell other mothers the same thing. Children brought up by hand should be fed with a spoon, not from a bottle, and food should be given every two hours.

Mr. President, I submit these few remarks for just what they are worth, and, as I said before, they are simply for the eye of beginners.

MATERNITY HOSPITALS AND THEIR RESULTS.

By JOSEPH PRICE, M. D., of Philadelphia.

Every obstetrician's dependence in emergencies must be upon himself; if the resources of his information and skill are so limited that he must call in extraneous aid the lying-in woman is exposed to other risks than those of delay—those of dangerous drugging or ignorant surgical interference. The resourceful surgeon is one with many experiences, and the same fact applies to the successful obstetrician. The lessons of three or four hundred maternity cases never yet made an eminently skillful obstetrician—one to be depended upon in all of the many emergencies liable to be met with in lying-in cases.

The problems—those testing the practical wisdom of hard-earned and well-learned lessons, the very genius of obstetrical skill—arising in many emergencies give no time for settlement by consulting the books, by reference to reported cases, or by calling in outside aid. In fact, the lessons of the books in many cases would be misguiding. Through many and painful experiences, the lessons of sad results, we have unlearned many of the lessons of the old books. There is grand promise in the fact that the profession of the period has in it the impulse and the spirit to grow

away from and above the old benches. One of the most gratifying and hopeful results of the thorough training which comes of wide obstetrical experience is the doing away in delivery with the too free use of instruments. Certainly with the lessons of more than two centuries of forceps experience we should be able to form an enlightened opinion as to the value or risks of their use. The consensus of the best authority, of the opinions of men who speak from the most extended observation and experience, leads to the conclusion that the mortality attending non-interference is less than that attending the use of forceps. In this relation our debt is great to the Dublin school of obstetricians. Dr. Clark, for long master of the Rotunda, stands out as the one heroic figure in the van of those pioneers. The exigencies requiring the use of instruments are not of such frequent occurrence as formerly. Now the citing of a case of instrumental interference is usually accompanied by an elaborate statement and explanation of desperate and otherwise unavoidable conditions. We have learned the evil and bad results of hurry; the welfare of mother and child is no longer to be sacrificed to the exigencies of private practice. With the growth of general intelligence our patients become less tolerant of undue haste; they have an enlightened appreciation of the issues involved, and of well-timed and skillful work, and they make few mistakes in their book-keeping in charging to the correct cause unhappy or fatal results. It is not a wild prophecy when we say that the time is not distant when in all dense communities obstetrics will be a specialty and in the ranks of its practitioners there will be the cleanest, most cultured, and scientific men of the profession. The issues, the often fearful sequelæ of ignorant or ill-advised treatment in cases of midwifery, furnish a strong warning, a resistless argument against the employment in such practice of the inexperienced and unskilled.

The advantage of patients in maternities over private lying-in patients lies in the fact that they are under the strict surveillance of experienced medical men, aided by nurses trained in all the principles and methods of their art. All the environs and appointments are under the control of well-defined and intelligent authority, sanitary and hygienic conditions are of more easy control, the evils of dense crowding can be avoided, and an ideal cleanliness more nearly attained. There are less injuries in maternities by attempts to expedite labor. And from this cause there are more evil consequences than from delay or any other cause; nature is interfered with in doing her part of the work. There is no branch of medical science in which we have so many understood certainties as in obstetrics.

Where our knowledge is defective or incomplete, it is not due to lack of authentic source, of easy and approved means, but to the lack of energy of use. There exist open opportunities of bedside experience and training, many open doors for clinical study and research, yet there are very many and the best kept closed. For this the profession is responsible. It is their mission and duty to heal; it is also their mission, duty, and royal right to the use of every avenue through which the best lessons are taught. The tyros going out from our college benches into fields of private practice are ill equipped for successful obstetrical work; they carry many risks to mothers. We are not claiming that the science or its practice in the hands of anyone is perfect; that can not be claimed of anything in which our humanity is involved. There has been gathered a very rich harvest of the result of cleanliness in maternities and private obstetrical work, and we have in these results promise of yet better results in the future. As we grow to know how very simple is our art, how near to nature is its successful practice, we feel less disposed to take off our hats when we speak of our individual work and its success.

It has not been long since obstetrics was the one department and dominated the field of gynecology. Progress has been such that gynecology no longer suffers the reproach of being a pseudo-science, working by guess, by vague suspicion, gaining advances by mere experiments upon human life, groping in the dark in attempts at settlement of problems of health and life, but has grown to work hand in hand

with obstetrics, and is gaining increased recognition wherever suffering exists. The lessons of both have come to live with us. In both experience teaches the value of cleanliness, that we have no right to tolerate filth in any of its forms, nor to blunder in our work. The signal advances in obstetrics, as in gynecology, are of our own generation. As to many anomalies, obscure troubles, the general practitioner has become enlightened; he has acquired the important knowledge which enables him to determine where purely medical or palliative treatment fails, and the only resource left is surgical interference. The obstetrician is not practicing what his forefathers wore out and threw away. Old theories and beliefs have been gradually giving way before the assault of our better facts. Each day finds fewer superstitions in practical medicine and surgery. Dr. Angus Macdonald, in a report of the Royal Maternity and Simpson Memorial Hospital, Edinburgh, condenses truths worthy of mention here: "The more I see of midwifery and gynecology, the more I am confirmed that the safety of patients urgently requires the diligent use of cleanliness. I feel more and more satisfied that operations on the genitals, of whatever sort, are specially dangerous, not so much because of the inflammatory reaction, which is likely to be severe in itself, as because there is extreme facility for septic absorption. This is particularly the case where, from aggregation of septic influences, there is specially apt to arise putrescent materials of highly toxic qualities."

The reduction of the mortality in lying-in hospitals, from 20 per cent to almost nil, can not be credited so much to the use of antiseptics as to a more enlightened and strict sanitary régime, a more strict cleanliness. The constant improvement in our operative statistics testifies the value of surgical cleanliness—scrupulous aseptic precautions. The great increase in the average of city life is largely due to greatly increased observance of health conditions. The measure of the physician's responsibility in these lines can not be overestimated. He can kindly, where that will serve, or sternly, where that is needed, urge the lesson that to live amid bad hygienic conditions in an atmosphere of domestic malaria means disease and death; that pure, healthy, indoor air, freedom from poisonous effluvia and musty odors can not be had without the most scrupulous cleanliness, the removal of all bodily excretions, of everything offensive—animal, fluid, and organic. There are outdoor impurities, sources of air pollution, we can not at all times and under all circumstances wholly guard against. Streets, alleys, and courts are often sources of atmospheric infection over which we have little or no control. The most we can do is to educate public sentiment in the line of a wise sanitary policy and back its administration. The members of the medical profession have it in their power to make themselves the sovereigns in the enforcement of the wise dictums of sanitary science. They are the real educators in everything that pertains to the public health. The people are willing and anxious to learn the lessons through the practice of which they can avoid disease. The more the obstetrician, and medical men generally, press home upon the public the vital truth of the preventibility of many diseases the sooner we will have a popular understanding of the simple principles of sanitary science and a rigid practice of cleanliness. Let the physician teach the risks of filth infection to his clientele—send the lesson into private homes that bedding, carpets, floors, walls, every appurtenance and furnishing, may be a source of uncleanness; that all forms of excreta impure gases emanating from decaying organic substances, is so much pollution.

The apology for this paper, if any be needed, lies in the importance of the subject, its importance to the profession, to communities, and its yet more grave importance to mothers. I would echo the voice of Holmes loud enough for warning:

"The woman about to become a mother, or with her new-born infant upon her bosom, should be the object of trembling care and sympathy wherever she bears her tender burden or stretches her aching limbs. The very outcast of the streets has pity upon her sister in degradation when the seal of promised maternity is impressed upon her. The remorseless vengeance of the law, brought down upon its victim by a machinery as sure as destiny, is arrested in its fall at a word which

reveals her transient claim for mercy. The solemn prayer of the liturgy singles out her sorrows from the multiplied trials of life, to plead for her in the hour of peril. God forbid that any member of the profession to which she trusts her life, doubly precious at that eventful period, should hazard it negligently, unadvisedly, or selfishly!"

I presume a long and somewhat varied experience entitles me to speak plainly, and the time for speaking plainly is always present, always now. As to the conscience with which I speak, that is mine. There are some things about which our national and international medical congresses should speak in no uncertain tones; there are some things that we here at home and our honored brothers of republics to the south of us should insist upon. Everything associated with our profession, with our schools and all their agencies, with respective fields and departments of practice, is a sacred trust, a trust something more than narrowly individual; it is community in all that it involves, its bond is to prolong and promote healthful human life. The trustees of our schools and maternities hold the highest trust existing in our communities, a trust that reaches helpless mothers and their more helpless offspring; that reaches the unfortunate in every grade of life; that humanity is their care. Yet they only too frequently do not exercise wisdom and deliberation in the choice of teachers and masters. The time is fortunately not distant when they will be held to more strict account. We have long since proven that maternal deaths are avoidable; deaths not only from sepsis or childbed fever, but from other causes as well; death in childbed means an error of omission or commission. The mortality in maternity hospitals is now the lowest. Maternities have settled about all the important disputed points in obstetrical practice. The most perfect work has been done in the maternities of Baltimore, Philadelphia, New York, and Boston. Not only has this work been perfect from the standpoint of a low mortality, but the hospitals in which it has been done have done a great work in practical teaching, demonstrating beautifully two points: (1) That a maternity can be run with a nil mortality; (2) that it can unite with its humane purpose practical teaching with a nil mortality. All this has been disputed both at home and abroad. The time is not distant when the directors of maternity hospitals will not dare to appoint a man to direct or have official charge of such vital interests without a rich practical experience and sound judgment; they will be held responsible for the success of their trust, and it is to be hoped will be held criminally responsible for the choice of a person to such trust with no more pride of personal cleanliness and cleanliness of environment than a stable boy—dirty in all the term implies, morally and personally.

It is the teaching of this subject that is of so much vital importance to the profession. Very much of it is fed out from the old books, and is worth very little more to the student than an old almanac of dates. The student gets little of clinical or practical value, and goes out from the college to study the science and art of his work upon helpless patients. Every day brings to our notice sad illustrations of the result of such miserably poor and inadequate obstetrical teaching. The directors or managers of our schools are responsible for imperfect, inadequate, or false teaching; the profession and the community must and do so hold them responsible; they are held responsible for the incompetent and unfit men they select to teach, for the injustice done worthy students, and for the irreparable mischief worked in communities by obstetrical ignorance. Teachers should not be appointed on account of their pedigree, their family connections, or their wealth, but for their brains, their knowledge of their subjects, their love and faculty for teaching, and for the honor and advancement of the school. About all some of those now holding responsible chairs in some of our oldest schools have to recommend them is a volume of prefixes to their names, suggestive of a medical and biographical index. The shout goes up, from doting relatives, maiden aunts, and friends who secure their appointment: "Now we have a professor of favored parentage, one dating beyond our accepted scriptural Genesis." At the claims of this class the Darwinian would

indulge a philosophic smile, and note fresh evidence in favor of his theory of the descent of the human species. There should be no small men, mentally or morally, in the faculties of our great school. The work of none of us is so well done but that it can not be outdone—better done. Let each man go back and study the history of his own neighborhood in connection with obstetrical practice, and he will scarcely escape being startled by the result.

Recently, within the past few weeks, several lovely women, moving in the most cultured and refined of Philadelphia society, have died in childbed. Now, these untimely and sad deaths are too frequent, in a majority of instances they are avoidable by the exercise of enlightened precautions, through the practice of that skill which comes of experience, and without which no man should enter a lying-in chamber. The old mock, tearful reverence, the pious humility, with which the deaths in these cases are credited to providential dispensation, will no longer answer. With each death the demand will grow stronger, more universal and angry, for better and more thorough obstetrical teaching.

I speak for the pride and best hope of our land, the American student, for the best loved, the purest, and noblest of our own or any other land, our American mothers.

A STUDY OF DYSTOCIA.

By SALVADOR GARCIADIEGO,

Director of the Academie Hospital of San Miguel de Belen, and of the Medical School of Guadalajara, Professor of Internal Clinic in the same, and President of the Superior Sanitary Council.

AN UPRIGHT SYMPHYSIS PUBIS A CAUSE OF DYSTOCIA.

The posterior face of the pubis inclines about 10° to 15° from a vertical line; but when this direction is less oblique the anterior curve of the superior strait is lessened and the antero-posterior diameter proportionately shortened. The inclination of the axis of the superior strait is usually about 45° from the promontory being much higher than the pubic symphysis, so that its plane, drawn from backward forward and from above downward, always shows an obliquity of 45° and makes a quadrant of 90° with said axis. The uterus, inclining from right to left from above downward and slightly backward during the last fifteen days of the period of gestation, works itself into such a position as renders its axis parallel with that of the strait and, after having occupied most of the abdominal, now settles down in the pelvic cavity. Nevertheless, when the anatomical defect which I have indicated does exist, the descent of the inferior segment of the uterus is impeded and this organ is therefore detained and held above the symphysis. Whenever the uterus is thus found abnormally high and when, after a thorough exploration, no apparent cause has been detected it becomes the duty of the accoucheur to inquire into the direction of the symphisis and ascertain whether its position be normal. During labor this obstacle necessarily impedes the downward progress of the fetal head into the cavity and, although the os may dilate and the bag of waters protrude into the pelvis, both the uterus and the head are detained; and what with the patient's strength already exhausted from the protracted labor, the membranes ruptured, and the liquor amnii drained off, the forceps must ultimately be resorted to and applied under unfavorable conditions above the superior strait and with a uterus already emptied of its liquid contents.

Dystocia is easily explained. The erect position of the symphysis alters the widening-out shape of the anterior segment of the superior strait and shortens, besides, by one-half to one centimeter, the antero-posterior diameter, substituting the oblique curve looking downward and frontwise of the superior border of the pubes by a plane surface with an almost vertical direction. This position raises its height and shortens the sacro pubic diameter to a greater extent than a measure-

ment with the pelvimeter points out, because, from the pubic edge being higher, it corresponds with a higher point on the promontory and imparts a higher eminence to the arc of the plane of the superior strait, so that the relation of this strait, and therefore of its axis, varies notably with those of the pelvis. As a consequence of this altered relation the uterus, upon assuming an almost upright position very nigh to that of the linea alba, during the utero-abdominal contractions has its inferior extremity and the fœtal head resting upon the symphysis and is prevented from slipping into the cavity on account of the more than normal forward projection and impingement of the promontory which precludes any possible correspondence of the uterine with the pelvic axis. Thus it is that, although no narrowing can be said to exist at the inlet of the pelvis, an obstacle is offered farther above which prevents the uterus from having any access to it, owing to the arrest which meets it at the pubic symphysis. The only indispensable conditions that may facilitate its progress would be a small fœtal head, relaxed abdominal walls, and the patient's assuming the genu-brachial posture or, at least, being seated in bed so that she could so incline her body forward as to impart a like inclination to the fundus and thus enable the uterine axis to run parallel with that of the superior strait which in such cases is inclined still more forward at an angle of 45° with a vertical line. This obstacle once overcome, the difficulty still remains. Admitting the pelvic axis to be nearly normal, and barring the influence which the greater elevation of the promontory exercises by way of an obstacle in the plane of the strait and which ceases in the cavity, the head is arrested in its progress toward the hollow of the sacrum by the crest of the pubes. If the contractions still continue strong, its flexion will become exaggerated and, on account of its fronto occipital diameter failing to correspond with the sacro-pubic, it will assume either a cervico-frontal or a cervico-bregmatic presentation, according to the degree of flexion it would have undergone. The difficulty will thereby increase and labor must necessarily be terminated by means of the forceps with due caution to avoid or, at least, to carefully overcome the delay proceeding from a parallelism of the binacromial diameter with that of the antero-posterior or oblique of the superior strait which is of frequent occurrence in these cases. The situation is furthermore very disagreeably complicated by the nearly asphyxiated condition of the child immediately after delivery owing to its long detention in a dry womb, the exaggerated flexion, and the unusual pressure from the blades of the forceps which its head has undergone.

In support of what has been advanced above I will, through fear of prolixity, report but one case, that of a lady who presented this vicious conformation of the superior strait and in whose case measurement revealed a narrowing of a half centimeter only. Having been pregnant eight times up to full term she was six times delivered with the forceps; the two remaining children were born naturally, having small heads. In these two latter instances the mother resorted to the postural method, seated in bed with the trunk very much inclined forward. The first born child was extracted dead owing to an excessively voluminous head. The perineum was considerably lacerated. The delivery of the second was followed by metritis and that of the third by permetritis both children born asphyxiated. The fourth required the application of the forceps. The fifth and sixth had a happy birth. The seventh was born asphyxiated with a fracture of both clavicles owing to the binacromial diameter having been detained in the superior strait. As a sequel of the last delivery, a very severe internal hemorrhage supervened.

Whenever a diagnosis of this anatomical defect can be established with full certainty, it is my belief that premature delivery should be resorted to, unless counter indications are present, rather than incur the dangers that arise from the severe trauma which the application of the forceps under so unfavorable circumstances unavoidably inflicts. In the above-reported case I refrained from provoking premature delivery, because I had failed to ascertain the cause of dystocia by means of a manual examination and, under the impression that the pelvis was normal, I

was led to ascribe the difficulties I had encountered to the disproportionate volume of the head of the first children. Nevertheless, during the seventh month of this lady's fourth pregnancy, I resolved to bring on labor and measured the pelvic diameters with van Huelven's pelvimeter. Although I found but a difference of one-half a centimeter, it shed sufficient light upon my mind to confirm the suspicion of an upright symphysis. The consulting physicians, whose opinion I had sought as to the advisability of inducing premature labor in this case, opposed the latter course; yet with deference to their enlightened judgment and weighing carefully the dangers which both mother and child are liable to incur in either case, I am inclined to adopt the latter, considering it attended with less danger.

I most respectfully court the opinion of my illustrious colleagues here present upon this question, and would highly prize their decision as a rule of guidance in the future.

REFLEXIONES SOBRE LA VERSIÓN POR MANIOBRAS EXTERNAS.

Por el Dr. FAUSTO URIBE,
Secretario del Consejo Superior de Salubridad y Catedrático Propietario de Patologías Internas.

Al tocar una cuestión de práctica ó inferir una consecuencia, no es mi ánimo sentar una profesión de fé para todos, sino sólo expresar mi convicción ante una reunión de sabios que espero me será indulgente, cabiéndome la satisfacción de que al provocar su resolución habré obtenido un juicio que será para mí como un criterio seguro.

La versión por maniobras externas es una operación que ha sido practicada desde tiempo inmemorial, que ha tenido sus partidarios en distintas épocas y que en el año de 1812 fué descrita por Wigan que la hizo de nuevo entrar en voga en Alemania.

Puede practicarse antes del trabajo y durante él. Las condiciones en que se lleva á cabo son múltiples, pero exige para su ejecución movilidad del producto de la concepción dentro del útero para poder llevar una de las extremidades, la cefálica ó la caudal, al estrecho superior y relación entre los diámetros del feto y de la pelvis.

Respetando la opinión de los autores clásicos, había siempre creído que era una operación de fácil ejecución y de utilidad indisputable, y confieso ingenuamente que en los casos de fracaso sólo atribuí el insuceso á falta de pericia, mas aún cuando esta no ha desaparecido de mí en la actualidad, he adquirido la creencia de que es una operación las más veces impracticable, y con frecuencia de ninguna utilidad, por cuyo motivo debiera, á mi juicio, hacerse desaparecer de la práctica común, reservándola sólo para ciertos casos tratados por especialistas parteros.

Paso á demostrarlo. La versión por maniobras externas puede tener lugar antes del parto y durante el trabajo. En el primer caso, desde el penúltimo mes del embarazo, según unos, y según otros sólo en la última quincena del noveno mes. Las circunstancias que la reclaman son las presentaciones transversas ú oblicuas que pueden sospecharse por la forma del útero, por las presentaciones viciosas de los partos anteriores y diagnosticarse por los medios que el arte nos enseña.

Bien, supongamos que estamos al frente de una mujer en el noveno mes de su embarazo, que ha tenido dos partos en que la presentación ha sido de espalda, que tiene un tumor abdominal cuyo diámetro transverso es mayor que el vertical, y que, por último, el tacto y la auscultación nos dan la evidencia de que el feto está en una posición transversa, con el occipucio á la derecha y el dorso hacia atrás. Hé aquí un caso en que según los partidarios de la versión por maniobras externas debe intervenirse poniendola en práctica inmediatamente para evitar los inconvenientes que indudablemente se presentarán á la hora del parto, de no ejecutar dicha operación.

Reflexionemos un poco sobre lo anterior. ¿Cual es la causa probable de las presentaciones de este género? A mi modo de ver, y siguiendo la opinión de los par-

teros Wigau y Danyau, es la forma del útero la que da lugar á semejante caso, siendo por tanto inutil hacer la versión que por poco trabajo que en estas circunstancias ofrezca, siempre será penosa para la paciente, y sus resultados de corta duración. He visto varias veces practicar esta operación en la última quincena del noveno mes, convirtiendo al parecer la presentación transversal en el vértice, inmovilizar el útero en posición conveniente por medio de vendajes y cojines, y recomendar absoluto reposo; y á la verdad que nunca ha faltado después pretexto para explicar el fracaso.

¿No es natural creer que la forma que el útero tiene ó la que ha ido adquiriendo en su desarrollo durante ocho y medio meses, es muy difícil cambiar en unos cuantos días? Además, quiero suponer que las maniobras hechas por la versión externa, sean siempre inofensivas, y que por tanto se diga que basta que alguna vez dé resultado la versión hecha en estas circunstancias para que no se le deba condenar como inútil. Mas, yo contesto esta objeción diciendo que las maniobras para la operación suelen tener serios inconvenientes; apresurar el parto, producir hemorragias, provocar metrítis y esperar á que el parto se presente sin versión prévia, que es siempre eventual en resultados, solo obliga al partero á intervenir oportunamente al momento de romperse las membranas ó cuando él las perfore, para practicar la versión por maniobras internas ó conbinadas; procedimiento que á más de seguro es casi siempre inofensivo y por lo que debe preferirse á lo eventual y algunas veces peligroso.

Supongamos que no se trata de hacer la verdadera versión, sino solo de variar una presentación inclinada de vertirse, que se cree que una vez corregida por maniobras externas será duradera hasta la hora del parto. En primer lugar, la inmovilidad necesaria para practicar la versión es la probabilidad más vehemente de insuceso; y en segundo lugar ¿Las presentaciones de este género, no son susceptibles de variar por sí solas en los momentos de la ruptura de las membranas? Cazeaux y otros contestan afirmativamente, y yo lo he visto más de una vez en mi práctica civil; por cuyo motivo aún en este caso creo que la versión por maniobras externas es inútil, y que debe el partero esperar, pues que al romperse las membranas, si la corrección no se efectua, la versión interna por maniobras conbinadas resolvería el problema.

Como dije al principio, la versión por maniobras externas también se practica durante el trabajo del parto, antes ó después de la ruptura de las membranas, pero siempre que la vacuidad del útero no sea completa y que el producto de la concepción permanece movible.

La intervención del partero será reclamada para llevar á cabo la versión por maniobras externas, cuando estando al frente de una parturienta, sus diámetros pelvianos sean normales, el feto en perfecto desarrollo se presente lateralmente, dejando sentir cualquiera de sus miembros, un codo por ejemplo, y no haya indicación precisa para proceder con violencia.

Pero bien está que el práctico ensaye su habilidad para que adquiera el convencimiento de que las más veces es impotente y que ponga á prueba la paciencia de su cliente, que al fin terminará por suplicarle suspenda esas maniobras que ella juzga inútiles y demasiado molestas y que le extraiga cuanto antes al niño por otro medio; y entonces no le queda otro recurso que, ó esperar la ruptura de las membranas ó provocarla para hacer por maniobras internas ó conbinadas la versión. ¿Y no habría sido por tanto más prudente sin maniobras externas haber esperado el tiempo oportuno para operar?

N. N., multípara, de regular constitución, pelvis bien conformada y que ha tenido cuatro embarazos, pario el primer hijo con la intervención del forceps aplicado á la extremidad cefálica á causa de la suma resistencia que presentaron las paredes blandas y el perineo, del desarrollo excesivo del feto y del agotamiento consecuente á un trabajo prolongado.

En el segundo y tercer embarazos llegados á término, hubo presentación de espalda con prolapsus del brazo derecho y mi intervención tres ó cuatro horas después de la salida de la mano por la vulva sólo sirvió para extraer por la versión interna, en los dos casos un niño que había dejado de vivir con anterioridad á la operación.

En el cuarto de alumbramiento fuí llamado oportunamente; el vientre era alargado transversalmente; presentaba una eminencia arredondeada en la extremidad derecha de ese diámetro; el tacto vaginal dejaba sentir un cuello dilatable y las membranas fetales luchaban por franquear el hocico de Fencalt en cada contracción uterina. Una hora después el cuello estaba completamente dilatado, los dolores se sucedían con regularidad á intervalos lejanos, y las membranas que habían conseguido entrar á la vagina permitían tocar á su través, una pequeña mano muy movible.

Según los partidarios de la versión por maniobras externas no sólo estaba indicada, sino que mi conducta había sido punible por no haberla comenzado á ejecutar desde mi llegada; pero en fin aunque tarde, mas sin haber dejado pasar la oportunidad, hice el diagnóstico de la presentación y dí principio á la maniobra, ayudado de un joven inteligente, practicante de la Maternidad, y despues de bregar como una hora no conseguí lo que deseaba, convertir la presentación de tronco en de vértice. El joven practicante insistió un rato más en las maniobras, queriendo conquistarse aplausos, pero los dolores aumentaron en intensidad y frecuencia; la paciente comenzó á enfadarse y cada contracción uterina parecía complacerse en deshacer lo que durante el reposo habiámos conseguido.

La convicción de mi impotencia produjo un arranque de esos de que suele no darse cuenta el operador y obedeciendo á él, introduje mi mano derecha préviamente desinfectada, engrasada y desnuda hasta el codo, en la vagina, rompí de un pellizco las membranas, palpé la mano que se presentaba, era la derecha, toqué el plano anterior y deslicé mi mano sobre él hasta coger un pié, que haciéndolo venir á la vulva lo deposité en manos de mi ayudante por intermedio de un lazo de venda que le puse; introduje de nuevo la mano, sirviéndome de guía el muslo del pié extraído, llegué al pié derecho que extraje sin dificultad y una vez reunido con su congenero sin olvidar los preceptos del arte terminé la operación, satisfecho de ver en mis manos un niño vivo y sin lesión alguna.

Al tenor del caso referido podría citar algunos otros pero creo basta lo dicho para probar que hay veces que la versión por maniobras externas es impracticable aún pretendiendo hacerla antes de la ruptura de las membranas.

Cuando el partero interviene en alguno de los casos anteriores, estando ya abiertas las membranas, si no hay indicaciones para obrar con violencia y el feto conserva aún cierta movilidad dentro del útero, dicen los partidarios de Wigan que aún así debe intentarse la versión por maniobras externas.

Mi escasa práctica y mi poca experiencia me han hecho adquirir una opinión diferente, juzgando que es hasta punible la conducta del práctico que á la cabecera de su asistida intenta perder el tiempo con maniobras inútiles porque casi siempre que las membranas se rompen á consecuencia del trabajo y la presentación es de tronco, el útero se vacia con prontitud y en breve puede traer serios inconvenientes. Por otra parte aunque sea corto el tiempo que consuma el hábil operador para la versión externa en dichas circunstancias, durante la maniobra, el útero irá perdiendo las aguas del amnion y el feto menos movible será resistente para efectuar las rotaciones que se le impriman.

La versión interna presenta dificultades para su ejecución, entre otras causas á proporción que el útero se vacia, y las probabilidades de éxito en igualdad de circumstancias aumentan á proporción que se opera con mayor cantidad de líquido en el útero, así es que en el último caso de ruptura de las membranas, no creo se deba maniobrar por fuera, sino hacer la versión por maniobras internas, inmediatamente, ó esperar el tiempo oportuno procurando entre tanto la menor pérdida de líquido amniótico.

De lo expuesto deduzco que si la versión por maniobras externas recomendada por algunos autores es muchas veces inútil y otras tantas impracticable, debe siempre ser reemplazada por la interna ó combinada, haciendo á aquella desaparecer de entre las operaciones tocológicas, y sólo conservarla para determinados casos y especiales parteros.

REMARKS ON FORCEPS DELIVERY.

By JAMES CAMPBELL, M. D.

The few words that I have to offer upon the subject of forceps delivery are in nowise to be considered as a formal discussion of the subject, but merely to point out one or two errors that I believe to be quite common and into which two classes of practitioners are liable to fall. I do not pretend to enter into the discussion of the forceps as an instrument or as a boon to the lying-in woman nor shall I occupy your time with a discussion of the various forceps operations, the history of the instrument or the many excellent varieties in use. Suffice it to say that, judiciously used, the instrument is one of the most valuable known to the profession. Its great value and the ease with which it can be used, coupled with a desire to do instrumental work on the part of the young practitioner and a desire to save time on the part of the busy practitioner may be set down as causes that tempt to its too frequent and injudicious use—a use that is both reprehensible and mischievous and which should be discountenanced by every conscientious practitioner of obstetrics. Another and very harmful use of the instrument is of far too frequent occurrence, namely, in that class of cases known as tedious labor (properly speaking, tedious first stage) there is a temptation, often yielded to, I am convinced, of putting on the forceps before sufficient dilatation has taken place, with almost a certainty that injury of the cervix will result and place another patient in the hands of the gynecologist. Allow me to briefly recount one or two illustrative cases that came under my personal observation—cases, the prototypes of which I dare say, most, if not all of you have encountered and can readily call to mind:

Case 1.—Dr. A., an excellent physician, well trained, and a skillful diagnostician was called at 2 o'clock in the afternoon to attend Mrs. M. in labor. He had an engagement to go out of town at 3 P. M., so ruptured the membranes and applied the forceps hurriedly delivering the fœtus in time for him to catch his train and leaving Mrs. M. with a badly lacerated cervix and an equally bad perineum both of which were repaired later on by another physician but not until Mrs. M. had been an invalid and a great sufferer for some time. In this case there can be no doubt (or reasonable doubt) that the hurried delivery was the source of the patient's subsequent invalidism and that such practice, though not uncommon, is unjustifiable.

Case 2.—Dr. B., a physician in fair practice, a man well liked by his patients, was called to see Mrs. M. and attend her in her first labor. She was 33 years of age. Long before the first stage of labor was completed he applied the forceps, "tentatively at first," he said, "but with great difficulty." When consultation was called he had had the forceps on four hours the cervix was bruised, torn, and swollen but was not fully dilated even then. The child's heart had ceased beating. When the delivery was effected the child's head and face were found badly bruised and cut and the skull crushed in.

The case requires no comment. Perhaps it would not be out of place to allude to another case which illustrates the extreme conservative, or "let-nature-take-its-course," aspect of the question.

Case 3.—Dr. C. was called to attend Mrs. O. in her first confinement. She was a delicate, refined woman of 25; she had always been anæmic and was notably so through the period of gestation. The cervix dilated slowly but well, the head descended slowly to the floor of the pelvis when the weak and inefficient pains ceased altogether. The physician watched and waited, and waited and watched for two days and nights while the patient's pulse and voice grew weaker and weaker and nature, aside from a few feeble, fitful pains at irregular intervals, did nothing toward completing the delivery. The child's heart had long ceased beating when consultation was called and the exhausted woman was nearly dead surviving only a few hours after the labor was terminated.

It might seem that these cases were peculiarly rare, or that they were overdrawn. Such, however, is not the case and their very frequency calls loudly upon the medical profession. I am convinced that there is no branch of medicine in which the rules of procedure are more clearly laid down and more frequently and grossly violated than in obstetrics. The past twenty years have brought about a degree of advancement and perfection in surgery, gynecology, and operative midwifery that

surpasses anything heretofore attained. May it not be that physicians have been so absorbed in the magnificent achievements attained and with which all medical literature is teeming as in part to neglect or lose sight of some of the simpler yet no less important matters in the obstetric art. I have known very good physicians while searching for a rare disease to quite overlook a common one, though the latter was no less important because common. That an operation is common by no means is its importance lessened but rather increased and because there seems to be serious neglect of the careful; discriminating use of a very simple instrument and, in some instances at least, a lack of knowledge of when and how to use it I have felt constrained to call the matter, though so homely a one, to the attention of this body of learned gentlemen fully believing that it is high time that the intelligence of the profession should call a halt upon the unnecessary and therefore unscientific and harmful use of the forceps in labor where, by careful guidance, the labor will reach a happy termination without instrumental interference. On the other hand, it goes without saying that the obstetric forceps should be resorted to on all proper and necessary occasions, as in Case 3 that I have related. It is quite unnecessary to refer to those cases where forceps delivery is entirely out of the question, yet the physician repeatedly attempts delivery by this means bruising and tearing the tissues only at last to discover that the narrow pelvis will not allow the passage of the fetus at all and lessening by his futile and injurious efforts the chances the patient had at the outset of recovery from the Cæsarean section or other operation.

I have already offered my excuse for calling your attention to so commonplace a subject and I certainly would have hesitated in so doing if I did not feel that my observation of the subject corresponded closely with that of other observers.

As far as I am informed, the physiology and mechanism of labor are carefully taught in the schools; but one has only to observe the practice of obstetricians to a moderate degree before he is driven to the conclusion that for some reason there is a great disregard of these subjects in practice at the bedside.

A FEW PRACTICAL QUESTIONS CONCERNING THE FORCEPS.

By W. FRANK HAEHNLEN, M. D., Philadelphia, Pa.

MR. PRESIDENT AND GENTLEMEN: The paper that I wish to present to you to-day is one of extreme simplicity and may seem entirely too rudimentary for discusson before so learned a body of medical men and yet I believe the lesson to be derived from it may be of use to some, and therefore present it.

It is not my intention to consider the forceps *per se*, nor the indications and contraïndications for their employment. The points that I wish to emphasize and discuss with you are those upon which there seems to be considerable diversity of opinion in the minds of general practitioners. Now, inasmuch as the great majority of labors occur in the practice of these gentlemen, it is incumbent on us as teachers and specialists to give them the benefit of our more extended experience in that line of work. I have deemed it expedient to arrange the subject-matter in the form of questions, in order that they may be easily discussed seriatim.

(1) Are we justified in using the forceps for the sole purpose of economizing time, regardless of the ensuing effects upon the mother and child?

(2) Are we again justified in employing the instruments in normal labors occurring in hyperæsthetic women?

(3) Should we apply the forceps ordinarily before the head has engaged at the superior strait and become more or less molded?

(4) Is it good practice to employ the forceps in slow labors that are otherwise perfectly normal?

(5) Are we justified in applying the forceps regardless of the position of the child's head, or the relation of the instruments to the head and pelvis?

(6) Are we justified in making traction regardless of the natural curve through which the fœtus has to pass?

(7) Is compression by the forceps justifiable beyond that degree which secures a firm hold of the head?

(8) How long should the head be allowed to remain in the vagina bulging at the perineum?

(9) Are the oscillatory movements of the forceps, in conjunction with traction, justifiable?

The truth of the matter is that practical obstetrics was, up to a comparatively recent date, almost entirely ignored in our medical schools and the consequence is that hundreds and thousands of medical men were graduated without having seen a case of labor or even a demonstration upon a cadaver or manikin. Forceps delivery is after all only the artificial execution of some of the mechanical movements which under ordinary circumstances are spontaneously described by the fœtus during its passage through the birth canal. It becomes at once evident, then, that the intelligent operator must first of all be thoroughly familiar with the pelvis itself, and secondly with the mechanism of labor in all its details. The closer we imitate the different steps in nature's mechanism, the more successful will be our efforts to deliver with the forceps. Of no less importance to success, however, is an accurate diagnosis of the presentation and position as well as the exact stage of labor that the woman is in at the time the forceps are applied. Definite knowledge, therefore, of the pelvis and mechanism of labor is of paramount importance to the practical obstetrician and ignorance thereof must sooner or later manifest itself in the practice of unqualified men upon whom the gynecologist largely depends for a certain class of his cases.

The answer to question 1; as to the justifiability of applying the forceps for the sole purpose of economizing the physician's time regardless of ensuing effects upon the mother and child might, at first thought, seem to be unreservedly and emphatically no and yet such an instance as this might be. Where two cases were in labor at the same time, with but one physician in attendance, the first being perfectly normal whilst the second was one of dystocia and urgently requiring the doctor's presence; should such an emergency as this occur it might be expedient to deliver the first case with the forceps in order to economize time in behalf of the second. This, however, I would only consider justifiable providing there was no decided contraïndication to the instruments in the first case and the extreme urgency of the second, for under no circumstance would we in any way imperil the life of one patient for that of another. So rare, however, are these emergencies that they scarcely affect the consideration of the above question; but inasmuch as they may occur once in a great while it seems at least worthy of a mention in this place. I would say in this connection that the forceps should never be employed in any case without there is a good reason for so doing. Unfortunately, however, with a large majority of men this ostensibly good reason may be anything that suits their own convenience and pleasure, the woman and child's welfare being to them apparently a secondary consideration. It is needless for me to say more than that this very common practice constitutes one of the most frequent abuses of the forceps and should be universally condemned. The reason for its condemnation is self-evident and needs no comment to the minds of intelligent practitioners. As simple as this question may seem, it is, nevertheless, one of great practical importance and the lesson gleaned from its analysis should be applied in practice, and emphatically taught to students of practical obstetrics.

Concerning question 2; with regard to the justifiability of employing the forceps in normal labors occurring among hyperæsthetic women I would say, that this condition of the woman *per se* does not constitute an indication for the instrument

any more than does a painful tooth indicate its extraction in every instance. How often, however, do we find the forceps being employed regardless of the necessary requirements for their use and often, too, when there is indeed a veritable contra-indication in the case. In my experience a far better result is obtained in these cases by the cautious administration of chloroform at short intervals, never, of course, carrying the anæsthesia to the surgical degree. A few whiffs at a time are usually sufficient to mitigate the pain without interfering in any way with the progress of labor. I consider chloroform a safe and efficient drug when properly administered and regard, therefore, the employment of the forceps in these cases as another of their abuses, responsible for much post-partum trouble.

In answer to question 3; as to whether we should apply the forceps before the head has engaged at the superior strait and become more or less molded, there seems to be considerable diversity of opinion. There can be no doubt of the fact, however, that the normal head of the child must undergo a certain amount of compression in its passage through the parturient canal and is moulded according to the shapes of the different circumferences through which it passes. This compression and moulding begin at the inlet with the engagement of the head and it is here that the very important initial step in the mechanism takes place. Any attempt to drag the head through this strait before it has engaged and undergone the necessary compression would be most likely attended with much risk to mother and child. The reason for not ordinarily interfering at this stage of labor is apparent to all, when we remember the time required by nature to accomplish the passage through this strait. A head that will not engage at the superior strait and is movable is a dangerous one to apply the forceps to no matter how careful the application be made. Version, in my opinion, is, in the vast majority of such cases, preferable. Few, indeed, are the instances where movable heads can be readily and safely grasped by the blades of the forceps.

Question 4; as to the justifiability of using forceps in slow labors that are otherwise perfectly normal might be answered very much as question 1. Here, however, the temptation to deliver with the forceps becomes almost irresistible in view of the double purpose to be accomplished by their use, namely, saving of the physician's time and the mother's suffering. Despite this fact, I do not consider forceps delivery in these cases advisable, providing the mother's condition is good, and there being no indication for speedy termination of the labor. Chloroform here, as wel as in the hyperæsthetic cases, may be used to advantage if the pain really warrants it.

To question 5 the answer must be given with a certain degree of reservation, owing to the several views held upon it by different obstetricians. Concerning the application of the blades to the head regardless of its position in the pelvis or the relation they bear to the head and pelvis, I believe all are now agreed that this should not be done and many are of the opinion that the forceps blades should be applied directly to the side of the head whenever it is possible. Of course, this can not be done when the head, i. e., any of its antero-posterior or vertical diameters, lies in the transverse diameter of the pelvis. In a case of this kind the head must be grasped obliquely until rotation into the oblique diameter takes place when the blades are then slid over the sides of the head to where they are best adapted. It is in regard to the application of the forceps at the brim that opinions differ most and it is in these applications that the common blunders are made by unqualified men who attempt to apply the forceps without the slightest idea of the position of the head at the time of the operation. Personally, I consider the oblique application, with reference to the mother's pelvis, preferable to the transverse and unquestionably the safest and best where the diagnosis is accurately determined and where the blades can be easily applied to the sides of the head. The reason for the oblique application in cases of doubtful diagnosis—and occasionally these will occur—is that if the head should be lying with its antero-posterior or vertical diameters in the transverse

diameter of the pelvis and its position masked by edematous swelling, the oblique application of the forceps will grasp the head in the best possible manner for that position. If, of course, it lies in the oblique diameter the head will be properly grasped by its sides. In short, I would advise the forceps to be applied obliquely in both high and low operations, where this can be readily done, except, of course, when the head is in the antero-posterior diameter, in which case the blades should be applied transversely with reference to the pelvis. A correct diagnosis of the position of the head is of paramount importance to successful forceps application.

In considering question 6; as to whether we are justified in making traction regardless of the natural curve through which the fœtus has to pass, I believe we are all agreed that this should not be done. Very many of the failures to deliver with the forceps result from misapplied traction. This, of course, is either the outcome of ignorance of the anatomy and curve of the parturient canal or indifference regarding the ultimatum of the case. An intimate acquaintance with the curve of this canal and the position of the head at the time the traction is made is very evidently important in order to deliver with the least amount of resistance. A head will frequently refuse to budge simply because it is being pulled in the wrong direction and the forceps in these cases are blamed for the failure in delivery. It is evident that the doctor and not the instruments is at fault.

Question 7; as to whether compression by the forceps is justifiable beyond that degree which secures the firm hold on the head can be answered in a few words. The forceps are not intended to compress the head so as to diminish its diameters; all of this that is necessary is accomplished by the resistance offered by the bony pelvis during labor and in a way too, that we could not artificially imitate. In my judgment, actual compression of the head by the instrument is not justifiable beyond that degree which secures its firm hold. Anything in excess of this point is apt to result in injury to the child and accomplishes but little toward facilitating the labor. It would seem, from what one sees in consultation work, that there are many men who consider actual compression as one of the essential powers of the forceps.

Question 8 is one rather difficult to answer. How long shall the head remain in the vagina bulging at the perineum? This all depends, as we all know or ought to know, upon the general condition of the mother and her soft parts. If the soft parts are rigid, but moist and the general condition good, the head advancing farther and farther with each successive pain, it may be safe to leave the head on the perineum for a considerable time, perhaps an hour or two. The reciprocal pressure between the head and maternal parts determines as to the proper time for terminating the labor. The errors of omission are equally as frequent as those of commission as regards the use of the forceps at this stage. It is astonishing what poor judgment is displayed by obstetricians at this most important stage of labor and owing to this, perineal tears and fistulæ that could have been otherwise avoided frequently result.

In reference to question 9; as to whether oscillatory movements of the forceps during traction are justifiable, I would say in the first place, that while this practice is condemned by some able obstetricians, and while I have due respect for the judgment of those gentlemen, I do firmly believe that, if practiced with care, they unquestionably facilitate forceps delivery without in the least injuriously affecting the mother or child. I have for some years past been in the habit of combining these pendulum or oscillatory movements with traction in cases where simply traction alone did not satisfactorily move the head. I have as yet to see a bad result following therefrom. I therefore advocate these movements in suitable cases and consider them a valuable adjunct to the ordinary traction. It is essential, of course, that the head be firmly grasped before this is practised, however; otherwise it would accomplish but little and might be productive of considerable harm to the child's head.

DISCUSSION.

Dr. S. S. CARTWRIGHT, Roxbury, N. Y. During the reading of Dr. Hoffman's paper on the "Axis traction principle in obstetrics," he made the remark that forceps could not be used in breech presentations, to which I wish to say that there are exceptions to all rules and wish to cite the following instances coming under my own observation: In the year 1854 I was one of the house staff of Bellevue Hospital and was present at the delivery of a German woman with forceps by Dr. Isaac E. Taylor, one of the visiting physicians. The case was a breech presentation not diagnosed before delivery. The second case was one occurring in my own practice, June 15, 1893. I made the diagnosis; but failed in bringing down either foot and could not effect delivery so I applied Simpson's short forceps. The first attempt failed by the forceps slipping off. I immediately reapplied them and had the satisfaction of delivering the patient of a living child. She made a good recovery.

Dr. FERNANDO ZÁRRAGA. The principal objection that can be made against the Tarnier forceps is that the compression is exerted with doubtful certainty; either insufficient compression is acquired and therefore the instrument slips or it is excessive and then the fœtus is made to suffer. The instrument which has been offered does not seem to answer the claims which have been advanced in its favor. It does not seem to render compression more effective and were it to slip would inflict much peril upon the mother. For practical uses I prefer the instrument of Levret and then only in cases of narrowing of the superior strait could an axis traction forceps be resorted to. The sphere of obstetrical intervention is thus narrowed down from the fact that in this progressive people, where indigence is exceptional, cases of rachitis and osteomalacia are scarce. In such cases I would abstain from using the forceps now demonstrated for fear it would slip. When for the first time I applied the forceps with parallel blades of Frelat, I well appreciated the risk to which the parturient was exposed in case of the occurrence of an untoward accident, admitting that with the above-mentioned forceps the operator's hand exercises the compression. A trial of the instrument in my hands has made it patent to me that the grasp of the blades is not certain and on this account not efficient and that the slip over the included hand will recur over the fœtal head. I regret exceedingly to state that the modification of Tarnier's forceps offered by Dr. Hoffman does not seem, in my mind, to have corrected the defects of the former instrument.

Dr. GILBERT advocated the intelligent and careful use of instruments, but instruments may be too complicated for general use. As to the time when forceps should be applied, the medical attendant must alone decide. This implies a thorough knowledge of our art and the circumstances of the case. Much depends upon the condition of the woman.

Dr. CHESTNUT, of Philadelphia. The advantages claimed for the principle of axis traction must be conceded; but the special instrument used and commended by Dr. Hoffman is not without grave faults. In the case mentioned, where the mother and child were lost in consequence of the breaking of the tapes, the doctor excuses the instrument; but I am confident that a tool that would break in such capable hands must be intrinsically at fault. In my opinion either the Simpsom or the Tarnier forceps are better.

In regard to the papers of Drs. Price and Wilson, I am sure that the publication of the results obtained by aseptic measures in lying-in hospitals is of great service to the profession, perhaps particularly so to those practicing away from the medical centers. It is to be earnestly hoped that these hospitals will be more generally open to medical students. However, I have just been informed that in one of the hospitals mentioned a series of cases of puerperal fever recently necessitated the closing of a part of the hospital. We may therefore learn how essential is never-ceasing care since even the most admirable system may sometimes fail.

Dr. EDW. A. AYERS, of New York City. The traction-rod forceps has a few objections which should be considered along with its many merits. Proper use

of the forceps requires no more compression than is necessary, the right fingers touching the head and cervix and the left hand adjusting compression to the needs. Both hands are busy holding the handles of the traction-rod forceps and can not tell that the head is rotating. The chief advantage in the traction-rod forceps is in their application high up. It is very important to avoid posterior rotation of the occiput. There is more liability of such an event in using the traction-rod forceps. With these dangers in mind they can be used to much greater advantage. I seriously object to delivering the head through the vulva with the forceps still applied.

THE INFLUENCE OF SURGERY ON MODERN OBSTETRICS,

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It must be admitted that in the province of medicine we are eliciting facts and establishing new principles where, heretofore, tardy advance and arbitrary rule were the dominant influences. The ancient history of our profession is deeply interesting; but it is far better to be acquainted with its modern research and progress. Each region of the human body, by virtue of its conformation, structures, and functions, demands a management peculiar to itself. Hence have arisen in our days the various specialties in medicine. The position of the surgeon has always been the outpost of advance, and this is preëminently the case in modern times. Obstetrics and surgery existed in the earliest history of the human race. Rude and humble in their origin, they have groped along for many centuries setting forth a relationship of interdependence. The province of midwifery was dominated exclusively by women from the earliest recorded times up to the invention of the obstetric forceps. When the laboring woman was in a despairing condition the aid of the male surgeon was invoked. From time immemorial, therefore, instruments have been wielded by the sterner sex. They have always exercised a marked influence in the advancement of both surgery and obstetrics. Instruments very similar to the obstetric forceps and the gynecologic speculum were used by the Arabians. The surgeon Roonhuysen broke through the darkness of midwifery when he invented the vectis. The obstetric forceps thus half discovered entered upon its beneficent mission about the year 1700. Three successive developmental steps are to be observed in the history of this noble instrument which mark as many eras in the history of obstetric advance. First, the introduction of the original straight forceps by Chamberlain in 1700; second, the invention of the pelvic curve of the forceps in 1747, by Levret; and third, when Tarnier invented the traction-rod attachments to the forceps. The first regenerating blow by this pivotal instrument was to strike down the death-dealing equipment of the surgeon craniotomist. The master stroke, however, was the annihilation of the horde of ignorant midwives and the relegation of this responsible branch of medicine to male attendants.

It was just about one hundred years ago when, through the inspiration of Baudeloque, science shed her first light on the anatomy of the pelvis and the child's head. He was the first to arrange and methodize the various positions of the child in its passage through the pelvic straits. At this time the forceps had not as yet attained to its highest vantage ground of development and was not applied according to any established rules. It belongs to its history that its power was so much abused that it was a contested question as to whether it did most of harm or good. Even in the times of Ramsbotham there was a bitter controversy between the advocates of craniotomy and those of the forceps. The majority of the English operators of those times, advocated the side of the surgeon craniotomist.

Tarnier, in giving us the traction-rod attachments to the forceps only sixteen years ago, made a suggestion which endowed the whole human race. His inven-

tion at once set up for this instrument a new and wider field of usefulness and life-saving—for both the mother and the child. Craniotomy at this time receded to a great extent from view and popular podalic version become almost a lost art. Tarnier's invention simplified forceps operations very much by dividing them into the high and low operation. The low operation is a relatively conservative help in labor. The high operation is a heroic one. Neither should be undertaken by any obstetrician unless he knows thoroughly the rules for the application of the forceps and the principles on which the science of obstetrics rests. Skill in the high operation is as essential as it is in an abdominal section. It is demanded in behalf of mother and child not only in the crisis, but as bearing on the future of the two lives. In fine, it can only be done safely for the great interests involved when knowledge, patience, tact, judgment, surgical skill, and asepticism shine forth throughout the whole management. The typical operator in obstetric work must combine both obstetric and surgical attainments. The first and ancient alliance between obstetrics and surgery was characterized by destructive craniotomy, the retrospection of which is appalling. The second was a reaction period in which surgery was well-nigh obsolete. These were the times of ultra conservatism. Appeals to modesty constituted an insuperable barrier to knowledge and advance. The pessary in its multiform shapes and the local application of drugs constituted the popular helps for the countless victims to the inexorable law of reproduction.

The invention of the retractor speculum by Sims, in 1866, marks the beginning of the third period, during which was materialized the domain of modern obstetric surgery. Surgery thus furnished an illustration no less striking than the influence exerted by the obstetric forceps. Like the forceps, the speculum has been presented in divers shapes and devices calculated to confound the student, many of which have brought neither fame nor income to their inventors. The specula in use are the original cylindrical or tubular speculum, the valvular or expanding speculum, and the retractor speculum. The last named is the highest development of this noble instrument. In the speculum and forceps, surgery and obstetrics embrace each other. Like the forceps, the speculum is simple in its construction and easy of application. It is a modest device, a trifle, but it limits the woes of nations and outweighs the costliest diadems. By the speculum the reproductive organs were more thoroughly explored and many operative procedures hitherto unknown were inaugurated. The use of the speculum suggested the uterine probe, tenaculum, dilator, applicator, and many other subsidiary instruments which served to widen the range of its usefulness. Add the bimanual exploration to the forces of the speculum, and we have the two diagnostic methods upon which modern surgical gynecology rests. These are likewise valuable aids to obstetrics.

Obstetrics widens the field of surgery. Surgery has, through its practice of asepsis, made obstetrics life-saving. The practice of surgical gynecology demands a thorough knowledge of obstetrics. To be an accomplished obstetrician implies a considerable knowledge of surgery. Gynecology is an obstetrical supplement, since far the greater part of it is obstetric surgery. The general practitioner, in whose hands the mother and child now rest, must reform his lines and burnish his equipment if he would prove himself worthy of his trusts as the modern obstetrician. A modern labor at hand presupposes considerable knowledge in advance of the personal history of the patient. The physician should have either chosen or approved of the nurse engaged. He would do well to keep a list of nurses whom he has carefully selected for their intelligence and trustworthiness in carrying out his instructions and thus curtailing the dangers brought to light by modernized obstetrics. The nurse is as often a dangerous ally as she is an efficient help. It may, however, be said in behalf of the "monthly nurse" that she meets many different doctors and consequently has not definite training, partly because of the wide divergence of practice and opinion she has observed. The details of labor will not be presented to you except so far as to show that modern obstetrics has found a noble ally and

valuable supplement in obstetric surgery. In entering upon surgical work, I dare say the first thoughts of the surgeon are: Am I clean? Is my patient clean? Are my instruments and appliances clean? Are my assistants clean? In like manner, in labor, the first practical step is to secure the absolute cleanliness of all persons and all things concerned in this function. The care and individual responsibility must rest upon the accoucheur. He must act as critic and censor compelling asepsis throughout labor and during the subsequent attentions to the new-born child. From the change of shape of the uterus from the spheroid to the ovoid by the initial pains of labor up to the time of complete cervical dilatation, which constitutes much the greater part of labor, there is no real need of digital examination, except to establish the fact that labor is at hand and the presenting part of the child. The involuntary pains of this stage have but one object, to open the cervical sphincter. Nature, as a rule, is to be trusted to do this even though a long time be taken. The resort to art in this stage in any known way is dangerous. How ingenious and wonderful is nature's arrangement of a hollow muscular organ acting upon a hydrostatic dilator which distributes equally the forces over the tense and thin margin of the cervical outlet. The disadvantages of premature rupture or the practice of artificially breaking the bag of waters until it has completely fulfilled its objects are clear. The advice to use voluntary bearing down or straining at any time during this preparatory phase of labor, to exercise pressure on the abdomen or to administer ergot in this stage are reprehensible. The expulsive pains, characteristic of the more rapid second stage of labor, warrant occasional digital explorations with an aseptic finger to keep advised of the measure of progress and to assure and cheer the patient. Frequent examinations of the patient remove the lubricating secretions from the obstetric canal and add to the risks of septic infection just as protracted surgical operations do. When the floor of the pelvis is reached the vaginal sphincter is made tense by each recurring expulsive pain. To exhort the patient to bear down with all her power at this time and expedite the birth, is wrong. This is the most critical juncture in labor. It is a virtue to go slow here. It is here that chloroform finds the opportunity for humane work, especially in the primipara. It relieves pain, limits the expulsive forces, and affords time for the dilatation to be gradually and normally effected.

The entreaties of friends and the patient, especially primipara, to give anæsthetics and use the forceps should not be yielded to unless mother or child is in jeopardy. It is questionable whether we are ever warranted in using instruments to curtail the pains of labor. It is doubtful whether nervousness and emotionalism ever call for forceps use. Loss of time on the part of the attendant never justifies the interruption of a physiologic process. Rigid os, inertia, cicatrices, resistant membranes, and obliquities of the uterus, common causes of delay, can not be treated by the forceps without extraordinary risk, especially in the primipara. The forceps is far the quickest way out of labor. Nature's plan is slow, but much the safest. It is a great gift in an obstetrician to be able "to wait and do nothing." The obstetrician who is inappreciative of nature's power and ingenuity and will not give her time in labor has great need for the surgeon and the undertaker. A short period of rest after the child is born and the afterbirth usually comes away with but little help.

A retrospective glance at the successive steps of labor, show four crises—the danger in each being surgical:

(1) The acme of dilatation of the external sphincter of the os uteri, sometimes resulting in laceration and demanding ligature of the circular artery of the uterus and primary trachelorrhaphy, but oftener the secondary operation.

(2) The acme of dilatation of the sphinctorial outlet of the vagina, culminating in lacerations and calling for partial or complete perineorrhaphy.

(3) Non-retraction of the fundus uteri after the expulsion of the child, causing primary or secondary hæmorrhage from the placental site and many times followed by subinvolution and requiring numerous surgical procedures.

(4) The ever-present danger of sepsis which makes labor from beginning to end a critical period.

1. The rules which hold for the management of the primipara apply to the multipara, save that more time is demanded in the former. The resort to art in first labors causes damage with greater frequency and the injuries are more grave. How can we curtail the frequency of these lacerations of the cervix? By avoiding the many acts of meddling in common practice. Among them are rupturing the bag of waters before the os is completely dilatated, the use of finger dilatation, manual pressure on the abdomen, the use of ergot, by limiting the use of the forceps and, when it is an absolute necessity, see that the cervix is dilated or dilatable. The test of the measure of dilatation should always be made at the acme of a pain. We should be more trustful of nature. We should recollect that in this dilatation stage art can only be appealed to as a matter of untoward accident or direct necessity. The high forceps operation is full of danger both to the mother and child. To overcome the resistance at the external os by the vis-a-fronte of the forceps is usually followed by deep tears and the surgeon must be called in sooner or later unless the obstetrician has the requisite qualification to repair such injuries. These wounds were until lately seldom recognized at the time of labor. They are not only diagnosed now but hæmorrhage from the circular artery of the uterus is promptly arrested and immediate union of the rent is secured.

2. One of the most delicate tasks which devolves upon the obstetrician is the regulation of the exit of the child's head through the sphinctorial outlet of the vagina. How can we throw proper safeguards around the parturient woman at this crisis? (1) By putting serious limitation upon the rapid transit of the body propelled through this outlet. (2) By diminishing the resistances of the vagina and perineum. (3) By judicious support of the perineum. Forceps use, or rather abuse, as a rule, causes the deepest and most mutilating lacerations. Let the resort to art be infrequent and the damage will be far less. If forceps must be used, draw the head down to the position for extension and remove them. Nature generally is equal to the task. Nothing is lost by the trial. Be it ever so little she does the amount gained diminishes the power to be exerted by art precisely that much. Always supplement, never supersede nature. There is a godly nihilism in obstetrics as set forth in labor among the lower mammals and there should be far more of it as applied to the human mother. Nevertheless, out of the prehensile power of the forceps has grown widespread abuse. Meddlesome midwifery has overshadowed the thrice blessed precept to "aid and abet nature." From the standpoint of surgery comes the strong conviction that there are many damaging obstetric operators. Relatively few surgeons assume the responsibilities and risks of capital operations and yet many tyros in the obstetric field perform high forceps operations. To determine the necessity for interference with nature's inimitable methods, the kind and gravity of the operation required, the power which will bring nature just up to the norm and no more, the kind of forceps to be used, and the rules to be observed by the operator, presupposes exquisite skill. It is not the purpose of this paper to decry instrumental aid in labor. We plead for the judicious and skillful use of the forceps. If it be an absolute necessity to empty the uterus chloroform should be given to the surgical degree. If not, administer sufficient at the beginning of a contraction to allay pain and to limit the voluntary element of expulsion. Sometimes a hypodermic of morphia is useful in reducing pain, securing rest, and restoring the flagging energy and courage of the sufferer. The writer is an upholder of supporting the perineum, confident in the belief that much may be accomplished both in preventing tears, and in limiting those that are unavoidable. Every obstetrician knows how almost impossible it seems in a goodly number of cases for the perineum to stand the amazing strain and stretching and yet it gets off safely. Perineal support should begin near the close of the expulsive stage of labor when the labia are gaping, the head is engaged in the ring of the vaginal sphincter, and the occiput

is in extension beneath the arch of the pubes. The support is given during the pains and remitted during the intervals, in order that the circulation, limited during functional activity, may be restored during rest.

The relationship of the hand to the underlying perineum is such that its thin margin can always be seen and the tear realized as soon as the fourchette and skin are beginning to be involved. Pressure of an aggressive character might, by reflex action, spur the uterus into increased activity. The arched palmar surface fits so nearly over the convex surface of the child's head and the diverging thumb and finger are faultlessly and wonderfully adapted to their position and use in perineal support. There is no limit to the possibilities in the use of the hand, and it is greatly to be feared that our great boons and inventions in the line of obstetric instruments have already curtailed and are continuing to depreciate our manual skill and power. Sitting facing our patient, who is on her back, we can judge of the length, strength, and rhythm of her pains; we can direct and control her straining as well as exhort, assure, and encourage her best. Should chloroform be indicated this position is the most convenient. As soon as the head is beginning to escape the skillful accoucheur, who has been in the attitude of "watchful expectancy," uses his hands with accuracy and expedition to guide the advancing head upward and forward along the line which is the axis of the parturient canal. Support must still be used, judiciously and efficiently, lest the posterior shoulder, abruptly impinging upon the fourchette, may cause the dreaded laceration. The head must be carried well up toward the mons while the posterior shoulder or both are escaping. Whether the position on the back or on the side be adopted, there is the same necessity for painstaking, rational support of the perineum. Undoubtedly it limits the necessity for surgical procedures. The surgeon is a witness to the grave ills to womanhood that result from neglected primary perineorrhaphy. Wounds of the genitalia following confinement differ from other wounds in that there is a continual drain of decomposing material from the involuting uterus passing over them and they are in close proximity to the two main eliminating sewers of the body. The dangers of septicæmia have a direct relationship to the depth and extent of these lacerations. The imperative necessity for primary repair of perineal injuries is not only sepsis, but to prevent uterine, vesical, and rectal displacements and disease.

3. It is to be presumed that every faithful and intelligent obstetrician follows up the uterus when the placenta is thrown off to see that it performs its function of elastic contractility, as a safeguard against hæmorrhage and as the initial step in involution. In case of hæmorrhage, doubtless a few men still live, who not only whip up the action of the uterus with ergot in the first and second stages of labor; but who also rely on it as a main dependence to arrest blood flow without regard to differentiation as to the source or cause of the flow. If the hæmorrhage comes from a laceration of the cervix or perineum ergot is not of material aid. The obstetrician should adopt the surgical and direct plan of seeking the bleeding vessel. It is very important that he should have ever ready in his mind the best and most expeditious plan to arrest hæmorrhage from the placental site. There should be no mistake or faltering about the resort to this ever-ready and best method first. Blessed be the inspiration that has brought us the life-saving knowledge of how to make our hands aseptic and how to use them, one in the cavity of the uterus and the other superimposed on the abdomen to check uterine hæmorrhage after labor. The well-trained hand enables us to make a diagnosis, which is the best of all foundations of good work in medicine or surgery. This accomplished, the treatment follows clearly and logically.

4. We are indebted to the Surgeon Lister as the pioneer in demonstrating the arrest of pus formation and to Pasteur and others for the original work in this line. I believe Sims first practically applied this principle to abdominal surgery in 1882. Surely surgery taught obstetrics the sterilization of instruments as well as the methods of combating sepsis. No greater boon was ever conferred upon the human family

than the introduction of asepsis and antiseptics. This saving clause applied to obstetric work has proven the physical redemption of thousands of parturient women. If the accoucheur has the requisite instrumental equipment as to obstetrics and surgery, has large and varied experience, has attained superb manual skill, and yet has not the means at his command to render himself, his nurse, and his patient aseptic in the strictest sense, he is a stolid, inhuman violator of the law, "Thou shalt not kill." The highest plane of antisepsis is reached in the surgery of the abdomen. This should be the type of cleanliness aimed at by the obstetrician. He should believe, adopt, and practice it without limitation or qualification as a pivotal fact in the world of medicine. He only is a safe guide and helper for the mother and her offspring who enters each case typically clean and who keeps his hands, his instruments or appliances, as well as the genital tract absolutely clean throughout the labor. All prolonged or difficult labors, and especially operative ones, should be managed with the greatest possible care, since fresh abrasions and deep lacerations urgently invite the ingress of septic germs. Neither the hand of the physician nor that of the nurse should ever touch the genitalia without having being carefully washed just before the act. The hand which touches anything not sterilized is unfit for the obstetric touch. The rules and plans which have made the most heroic surgical operations relatively safe are within reach of the obstetrician. So long as he fails to follow the lead of the aseptic surgeon in the observance of these rules of asepsis and the superadded blessings of antiseptics, so long as he scouts and ignores the laws of mechanism of labor, so long as he fails to repair the lacerations that occur under his management, and so long as he is incapable of using the forceps skillfully; so long is he an untrustworthy obstetrician. Very many obstetricians are using proper precautions against septicæmia in childbirth; but there are, I fear, some who are still skeptical and who are therefore beneath the low-water mark of cleanliness. As to the midwives who are the very prototypes of their predecessors in medieval times, their indoctrination would be like efforts to penetrate darkest Africa. In the meanwhile the "massacre of the innocents" goes on. What can we do to stay this cruel, wanton destruction of the wife, the mother, and the child? I am told that some of our transatlantic brethren have recently inaugurated training schools for midwives. The sacredness and responsibility of obstetric work makes the thought of relegating it to midwives most repellant. In these days when such a noble and inspiring effort is being made to elevate the standard of qualification in medicine why should this branch be degraded? This midwife débris should be swept away. The number of physicians in the city of Baltimore at this time is 576. There are 52 midwives. The latter attend relatively a very large proportion of the labor cases which occur. The elevation of the standard of education adopted by the medical schools in this country and demanded in the interests of the people by State boards of health, appointed by the governors of such States, have apparently failed to accomplish fully the desired end. There is a large class of people in all the large cities especially, who do not get the least advantage out of the advance movement and legislation as to higher and better education on the part of those who are engaged in the medical province of obstetrics. The poor and ignorant continue to be at the mercy of the untutored midwife. In the meanwhile the young doctors, infinitely better qualified, are waiting and longing for practical opportunities in obstetric work. They must ere long be the successors to the doctors of older growth. Pending the discussion many lives are being lost from sepsis and mismanagement in labor. There is a common platform for the obstetrician and surgeon from which to plead with the people against the physical detriment which is the outcome of the unnatural relations of the sexes. Though heaven comes down to earth and seals the matrimonial alliance with solemn vows and a holy kiss, though kindly nature does her utmost to compel fructification, and though the love of offspring is the most imperious and universal of all sentiments, criminal abortion, cowardly and wicked as it is, seems a growing evil. Criminal, together with accidental abortions, demand alike the

merciful care and aseptic management of the obstetrician and surgeon. These murderous violations of nature, while they attain the object of limiting families, claim attention on account of hæmorrhages, sepsis, subinvolution, displacements, polypi, ovaritis, salpingitis, sterility, and other ills and often lead to the heroism of abdominal surgery. The practice of unnatural coitus is a most fruitful and deplorable source of neuroses, mental alienation, and physical disabilities in both sexes. There is an ever-mysterious and dangerous field which, more than any other, impresses the necessity of the gynecologist being a skillful obstetrician. How difficult and often past comprehension the mazes of early pregnancy! What serious apprehension and responsibility confront the attendant! The pitfall is doubly dangerous, since it involves two precious lives. The nicest realizations of tactile sense and the cleverest use of the bimanual exploration concenter here. Every woman who becomes pregnant should select her physician as early as practicable and consult him from time to time as to her progress. For every case of pregnancy there are hosts of humanitarian advisers and prophets. Warning is always timely against prevailing superstitions and the sympathetic and well-meaning, yet ignorant, "old woman," who is represented in both sexes, in all colors, and in any age.

Before closing, allow me to refer to one of the most glaring and fatal elements of bad obstetrics brought to light by the health boards of all large cities, and to refer to its surgical bearings. After labor it is common practice for the physician to pay a visit on each of eight or nine days. It is often assumed that responsibility has ceased and that social calls meet the requirements. In the meanwhile the infant, less fortunate than the pig and pup, has been robbed of its natural rights, mutilated in its instincts, and estranged from its maternal breast. As soon as the child is ushered into the cold world there comes to the true obstetrician its welcome and assuring cry. At such a moment the average "monthly nurse" spontaneously exclaims, "Poor little darling! it's hungry." The number of deaths from cholera infantum reported by the health department of Baltimore in 1891 and 1892, during the months of July, August, and September, were as follows: 1891, July, 259; August, 112; September, 56; 1892, July, 337; August, 161; September, 37. There is a nationality about baby stuffing. The American nurse adopts by preference, catnip tea; the German, chamomile or fennel; the French, absinthe; the Irish, whisky. If these medicaments are not adopted, cow's milk diluted, condensed milk, sugar water, and many other substitutes for the natural beverage are offered. The excuses usually offered are that at first there is no nutriment, the parent needs rest, or she is too delicate. Again, the unnatural mother will not be annoyed by nursing—she is fond of the opera, the ballroom, or the bicycle. Possibly she has a fancy for baseball or other manly diversions. The infant is thus too often turned over intentionally or unintentionally to the cow, the wet nurse, or to the manifold artificial foods. Japan is said to be the elysium for the infant. It is the land where there is no cow's milk; where artificial lactation is altogether unknown. The Japanese mother is the most perfect and successful of mothers, because she abides by that reciprocal and universal law which throughout nature binds the offspring to its natal soil. An inquiry of the health officers of all the large cities will tell the same story of high infantile death rate during the heated term; it will also elicit the fact, which would be corroborated by every intelligent practitioner in such cities, that the victims are, with rare exceptions, the children more or less artificially fed. But, how about the other victim? If a primipara, there is usually with the expulsion of the placenta a tonic and relatively complete retraction of the uterus. If a multipara, afterpains are expected and the attendant is importuned to give anodynes. This very old and vicious practice has not yet been entirely expunged from the record, notwithstanding the uterus is still exercising the powers which belong to active labor to get rid of foreign material that it may foreclose against hæmorrhage and sepsis, and make a good beginning on the retrograde changes of involution. The cause of afterpains is not always the same. If they are unbearable they should be determined by

manual exploration and, if possible, removed. The early application of the child to the breast excites uterine contractions and consequent afterpains. Are we not warranted in adopting for the child the unerring instinct of the young of the lower animals that go directly to the nipple and ignore all else? Looking on the act of lactation let us be impressed with the safeguards that kindly nature has thrown around the mother and offspring. The shape and position of the nipple is well adapted to seizure by the mouth. Closure of the lips and use of the tongue in the act of suction is such that the nutriment is extracted directly from the vital laboratory, the breast. It is conducted in swallowing, through an air-tight passageway to the stomach, thus excluding the dangers of pathologic germs. The relegation of the child to artificial feeding is the most prolific source of imperfect development, disease, and death that can be laid at the door of the obstetric practitioner. The more shame, since these calamities to the human race are in great measure preventable. Not only does high death rate ensue from disobeying nature's law as to keeping the child to the breast, but the very foundations of human life are disturbed bodily, mentally, and morally. The effect on the mother who does not nurse her child must be well known to every observant obstetrician and gynecologist. To discuss the various pathologic changes which primarily and secondarily occur, and the surgical operations which ensue from these sinful omissions would unduly lengthen this paper.

The ancient history of obstetrics is probably more complete than that of any other branch of medicine. The old man of large experience has long been accepted as the typical man for obstetric work, whereas anatomical knowledge, which the young man knows best, is the foundation stone. The dear public must have always thought much of the virtue of senility. Obstetrics has suffered from time immemorial from the old woman and the old-womanly man. Experience in walking is of little value to the blind. There are pitfalls and disaster all along the obstetric passageway to him or her whose anatomy, physiology, pathology, and surgery are safely bound up in musty, neglected, and antique volumes. The accomplishments of the young man and a goodly amount of the experience of the older man seem to meet the requirements of the good obstetrician.

There is such a low scale of remuneration in obstetric work that it is rejected by many men best qualified for it. Nearly every obstetrician thinks himself an operator. Yes! any man can operate; but not safely for the two lives involved. Think of the heavy responsibility of the attendant in the lying-in room. Every prescription is directed to two lives, all hygienic counsel for a double interest. Only reflect on the many blundering, lacerating operations on the head of the child and the pelvis of the woman. With operators ignorant of the physiologic and mechanic phenomena of labor and without definite training in the use of the forceps, what is to be expected but that force will be followed by accident, injury, disability, or death? Obstetrics is the most useful, the most attractive, and yet the most neglected branch of medicine. Why is this? Is it because of the slurs of the people upon the male granny? Is it because of the belief of many that the untutored and cheap midwife is as good as any doctor? Or is it that there are glittering gynecologic fields near by which are luring men away from the poor and therefore uninviting field of obstetrics. The gynecologic surgeon is worth little if he be not obstetric in his taste, his study, and his practice. The obstetrician must be sufficiently trained in surgery to immediately repair the tears which occur in his own work. Obstetrics and gynecology are one and indivisible; they moderate, rectify, and guide each other for the sovereign purposes of cure.

RECENT SURGICAL ADVANCES AND THEIR RELATION TO CONSERVATIVE OBSTETRICS.

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The term "conservative obstetrics" may be interpreted in two ways; to those who believe that delivery is best effected by nature alone, it means the withholding of active procedures in that they involve a possible interference with the natural process; on the other hand, to those who rely upon the strict observation of indications to determine when nature calls for aid, it means the intelligent choice of artificial means to delivery at the proper time. Obviously the first interpretation is wrong, and if it had been held as the standard of practice by the best obstetricians of the earlier schools we should not have had the science of obstetrics enriched by the resources of the present day, surgical or otherwise. As to the second interpretation, it is the object of this paper to discuss the degree to which the introduction of modern surgical methods has influenced the conservative treatment in obstetrics. We shall, with this end in view, consider the surgical treatment of ectopic gestation, abortion, dystocia from contracted pelvis, and septicæmia.

Ectopic gestation.—At first sight it seems inappropriate to consider the surgical treatment of this affection as having any bearing upon surgical obstetrics. Properly the subject belongs to the province of gynecology; the early confusion of the signs of tubal pregnancy with other pelvic lesions, and the similarity in treatment, placed this affection naturally within the limits of this specialty. But, outside of the surgical treatment of ectopic gestation as an obstetric complication, that is, in the later months after the formation of the placenta, obstetric science has been benefited by the recent surgical treatment of this condition in two directions. Surgery, in the first place, has made the pathology of the condition clear and it has also shown the frequency of its occurrence and has demonstrated the process of the development of the ovum in its unnatural position and the liability of rupture of the sac. In the second place it has cleared the question of diagnosis, and made the early history of cases of suspected pregnancy a subject of more careful observation than formerly. The successes from the use of the knife are supplanting the more uncertain methods of treatment, such as electricity and similar unsurgical procedures (aspiration and the injection of morphia into the sac, etc.). Obstetrically we may discuss two conditions, the result of rupture in tubal pregnancy: First, when the sac ruptures into the peritoneum and the placenta continues its development, either by transplantation or marginal growth, and pregnancy advances to term. Under these circumstances we are confronted with the danger to the child and the danger to the mother from secondary rupture of the sac, with escape of liquor amnii into the peritoneal cavity. The treatment is abdominal section with drainage and packing of the wound, the remnants of the sac being removed by irrigation. The results at this stage are unsatisfactory. Sutton has collected 6 cases where the operation was performed between the seventh and ninth months of gestation, the child being alive. The mothers recovered in 3 cases; in 2 cases the child died within a few hours after delivery; in the other 4 cases 1 child lived six months, 2 children lived eleven months, and 1 child lived to maturity. Secondly, in those cases where extra-peritoneal rupture has occurred we may have pregnancy advancing to full term. The fœtus, however, is apt to die during the early months of gestation, or if it survive, it is apt to undergo transformation into adipocere or lithopedion. In any case removal at or before term, depending upon the time at which the diagnosis is clear, is indicated. The abdominal method is to be preferred to the vaginal incision. To illustrate the progress due to surgery in the treatment

of ectopic gestation we may quote Ross, who alludes to the statistics given by Parry in comparing the results of primary operation with those when the cases are left to nature. Parry found the mean mortality for primary and secondary operations combined 52 per cent; the mortality of the cases left to nature was also 52 per cent. The comparison between the results of treatment in the period of undeveloped surgery and the results of to-day is striking.

Abortion.—In no field of obstetrics has there been such a revolution in treatment as in abortion. The profession, however, are not as one as to the best form of treatment and are divided according to their advocacy of the following methods: The expectant form which we may consider as the teaching of the conservative school, in which instrumental interference is decried; the radical form, in which the uterus is emptied of all traces of its contents irrespective of symptoms of retention, and in which the curette plays the most important part; the modified radical treatment, in which the cavity of the uterus is invaded when symptoms of local infection or bleeding determine active interference, either the curette or the finger being used to remove retained decidual tissue. Surgery has been responsible for the development of the radical form through the light which it has thrown upon pelvic pathology. Cases which have come to abdominal section, either immediately after the abortion or after the development of the later effects, have shown the danger of neglect in early management. Under the earlier form of treatment, as soon as the bleeding has ceased and the local symptoms have disappeared the patient has been dismissed and the later observation of the case neglected. Involution in such a case has possibly been imperfect and improper circulation from the uterine engorgement which is present has reduced the normal power of resistance of the endometrium to pathogenic organisms. As a consequence some placental débris or newly formed thrombus has become infected; this local infection extends either by the lymphatics or by continuity from the endometrium to the mucous membrane of the tube and produces the condition which calls for the surgeon's knife. There is no doubt that before the era of abdominal surgery the connection, in many cases, between the abortion and this latter condition (salpingitis, peritonitis, pelvic abscess), had been overlooked. This, however, is not equivalent to saying that the expectant treatment always results in this condition.

The remarks of Dr. C. W. Earle, in a recent discussion during a meeting of the Gynecological Society of Chicago, are pertinent in this connection. He says:

"The question whether in every case where a small particle of membrane or a small piece of placenta is left it is best to go into the uterus with the finger or something else and clear it out, I believe not. It is prety safe in the majority of cases if no hæmorrhage is present and everybody concerned is careful, to leave very small particles rather than subject the woman to another danger of infection by introducing the hand. I remember once taking away some membranes, perhaps 4 or 5 inches in length, days after confinement, that were perfectly white and absolutely without odor. I believe that if a careless obstetrician had introduced his finger or an instrument into the uterine cavity for these membranes he might have infected that woman."

This, however, is an optimistic view, and if we have learned anything from our surgical training, it is to dread the presence of such a source of infection as retained membranes and placental tissue offer. We are not, on the other hand, committed to the radical treatment by which, as a prophylactic measure, we are called upon to curette the uterus as a routine treatment irrespective of hæmorrhage or symptoms of retention. Nor are we always called upon to use the curette to remove retained decidua either immediately after abortion or in the event of the appearance of symptoms of local infection, as advocated by most advanced teachers. In the first instance the uterus can be cleaned by the finger as a curette and afterwards irrigated if necessary and in the second instance the infecting mass can be diagnosticated by the introduction of the finger and removed manually, the endometrium afterwards being disinfected by the intrauterine douche. The curette is to be reserved for those cases in which the process is one of acute infection of the endometrium where digital

curetting with irrigation has failed to reduce the temperature. The reason for this is that the curette is apt to dislodge thrombi and penetrate the mucosa, thus opening a new channel for the absorption of infected material. Good surgery, which means absolute antisepsis, has taught us further that tamponing in cases of hæmorrhage from abortion is a temporizing measure fraught with great danger of infection and that where we have bleeding we are to empty the uterus as speedily as possible. Digital dilatation and extraction of the ovum and its remains are to be accomplished, either the finger or the sharp curette being used for the latter purpose.

Septicæmia.—In the treatment of septic endometritis and peritonitis we meet with the most marked change of ideas. The strongest advocate of the surgical treatment of this condition is Pryor, who recommends curettement and packing of the uterine cavity for beginning septicæmia, basing his treatment upon an incontrovertible theory of the pathology of the affection. He states that, "Innumerable clinical as well as other facts show us that the lymph channels are the most usual, most persistent, and most serious carriers of this form of infection." Concluding from this that septic infection occurs by means of the lymphatics draining the infected endometrium, the seat beyond dispute, as he correctly argues, of beginning puerperal infection, he recommends the use of the sharp curette as soon as the diagnosis of beginning infection is established, stating that, "Its range of application is greater than that of any other instrument used in gynecology." In the heat of enthusiasm laparatomy at one time was the method par excellence of approaching and draining an infected peritoneum, yet Pryor writes, "I have almost come to the conclusion that when you can not check puerperal sepsis by irrigation, curetting, and antiseptic dressings, the case is beyond immediate surgical relief. By the latter expression I mean the ether, operation, etc. (in laparotomy), will destroy what little chance for life remains and that it is better to let the woman alone. But if I did a section I would most certainly ablate the whole organ. Simple removal of the tubes and ovaries I deem worse than useless." On the other hand, we have the previous phases through which the subject of treatment has passed occurring in quick enough succession. Martineau wrote in 1884, "Refrain from all manipulations, all active interference as long as adenolymphitis exists," while Polk writes, "For the present, then, until we can improve our methods, I would suggest, in the event of the failure of intrauterine drainage in these cases, an application of the open method of drainage (by laparotomy) to the surroundings of the uterus as an additional procedure." The choice as to which of these surgical procedures should be adopted, curetting with drainage or abdominal section, depends upon the existence of the symptoms of a local peritonitis or those of an acute infection occurring from the endometrium. In the first instance we have an accumulation of pus, either an abscess or a preëxisting pyosalpinx requiring drainage by abdominal incision; in the second we have an infected endometrium with lymphatic absorption, requiring curetting. If we are therefore left to choose between curetting with drainage from the endometrium and laparotomy with external drainage, we are required to make at an early stage an absolute diagnosis of the condition, our choice of treatment being based upon the character of the infection. On one hand the absorption is usually so rapid and the development of symptoms so acute that to wait for the detection of a localized accumulation of pus before active treatment is instituted means death for the patient. On the other hand, the use of the curette for initial symptoms is dangerous and for the following reasons: First, the risk of perforation, although this is not a serious consideration in the earliest stage of involution and when the instrument is used with ordinary care; second, the risk of introduction of septic material from without; third, the separation of thrombi at the placental site and the opening of fresh channels of infection. The curette is recommended when the endometrium is the seat of an acute septic process and the peritonitic and tubal involvement is recent and acute. The question is whether in such cases, after the development of these symptoms, the infection along the course

of the thrombi and the lymphatics is not already too far advanced to be reached by this means of treatment? Are we then to abstain from every form of local treatment because our efforts may be ill-timed? Hardly this; but we are to resort to methods bearing with them less risk and which show statistically better results. To surgical advances in this field of the subject we are indebted for special accurate studies in pathology which have thrown light upon the manner of infection and the character of the infecting elements. We also owe the establishment of asepsis in midwifery to the recent advances in surgery. In these directions the science of obstetrics has been elevated by the adoption of surgical procedures. These modifications, however, have their limit and it is a question whether by surgical means we can surpass the careful conservative treatment of to-day, the treatment which relies on absolute prophylaxis, the judicious use of salines, and calomel and stimulation. By prophylaxis we mean absolute cleanliness, abstinence from unnecessary examinations, the use of the ante and post-partum douche, except in cases where unusual manipulations have been necessary, irrigation and the use of iodoform internally, and the application of the ice bag externally in the initial stage of infection. In support of this method of treatment the following statistics from the records of the Philadelphia Lying-in Charity from May 1, 1891 to May 1, 1893 are added: Number of deliveries at term, 488; number of deliveries before term, 8; average highest temperature, 101°; average duration of rise above 100.6°, 4 days; mortality, 3. (The writer is indebted to Drs. G. W. Boyd and O. Hopkinson for records from their terms of service.) Of these cases only one required surgical treatment, laparotomy for obstruction. Among the number of cases reported there were 39 cases in which complications such as mastitis, eclampsia, enteric fever, mania, etc., were accountable for the rise in temperature. It will be noticed that the treatment followed, as noted above, has been altogether conservative; the mortality record shows 1 death from exhaustion in a case of twins, 1 pulmonary edema, and 1 following laparotomy for obstruction of the bowels. A study of the records will show that the indications have been carefully observed and that the results which have been attained are due to prompt and active treatment.

Symphyseotomy and Cæsarean section in contracted pelvis.—Within the past few years our resources in the management of difficult labor from pelvic contraction have been surprisingly increased. This has resulted not only in reducing maternal mortality; but in obviating largely the necessity of embryotomy. This latter result has rightly served as the plea for surgical intervention. Symphyseotomy and Cæsarean section have come to occupy the most conspicuous position among obstetric operations and it is our purpose to discuss here their relative merits and indications. Primarily this will lead us to the question of choice between the various obstetric operations, including these, and will bring us to the realization of the importance of the exact study of the indications in every case. It will be most profitable to glance first at the merits of these more important operations (I mean important in the sense of their magnitude) and then to consider their advantages over the other forms of treatment advocated by the earlier school and by the more conservative teachers of to-day. Finally we may mention the dangers of these recent operations—those connected especially with symphyseotomy—as we are at present in the stage of enthusiastic expectancy over this operation, a stage in which the dangers are apt to be forgotten or overlooked. The question resolves itself into the choice of operation in individual cases, and its bearing upon the present discussion lies in the limitations to which the more conservative operations (induction of labor, version, application of forceps and embryotomy) have been confined. We must admit at this time that Cæsarean section and symphyseotomy have gained a recognized position and that there are certain cases which require one or the other of these operations and preclude all other possibilities of treatment. What are these cases? According to the statement of those qualified to give an opinion, we may say that in simple flattened pelvis a con-

jugate diameter below 2¾ inches calls for Cæsarean section and that symphyseotomy is reserved for cases in which the diameter exceeds this. Hirst, however, recommends induction of labor combined with symphyseotomy in "any grade of symmetrically contracted pelvis we are likely to see in this country." Does this not, therefore, substitute for Cæsarian section symphyseotomy with induction of labor in cases where the Porro operation is not indicated? If so, what advantages does this form of treatment offer over those of Cæsarean section, and what dangers does it bring with it? In this procedure we expose the patient first to the risk of infection incident to the induction of labor, and to the delay and manipulation of dilating the cervix; and, secondly, to the unavoidable risk of rupturing the vagina, lacerating the sub-pubic soft parts and hæmorrhage from injury to the venous plexus surrounding the urethra, incident to the performance of symphyseotomy. On the other hand, Cæsarean section requires no more surgical skill on the part of an operator who has any claim to the title of an obstetric surgeon and admits of the delivery of the child without the after application of the forceps. Both operations require special surroundings and careful selection of the time of operation; but Cæsarean section demands much less time for its performance and exposes the patient to less risk of infection. The most recent statistics furnished by Dr. Harris will be of interest here. Since the introduction in the United States of symphyseotomy "4 women of the 25 operated upon have died, and 6 children have been lost, three of the latter having been stillborn." To quote Dr. Harris further, "Compared to the conservative Cæsarean sections of the best European maternities, we find that symphyseotomy has a greater mortality, both for mothers and children and the difference is very marked as to the latter." In order to obtain even the most favorable of the results in symphyseotomy cited above, the operator requires absolute control of the cases, and the most special adaptation of the surroundings such as can be procured only in the most carefully conducted maternities. These conditions reduce the art of obstetrics to a surgical science and the practitioner stands toward his patient as a surgeon who waits only for the time of intervention to deliver her instead of depending upon his skill as an obstetrician to aid the natural process of parturition. This makes diagnosis the only essential factor in the case, a position which presupposes that art in diagnosis is unerring and leaves for the obstetrician only those cases in which the indications for surgical intervention are positively wanting. The greatest disadvantage of this teaching is to make the profession regardless of the necessity for forceps and version in cases of moderate contraction and in those cases in which the operator has been called at an advanced stage of labor without any previous knowledge of the patient—a class of cases in which surgical interference is not to be considered—and fixes his attention upon the surgical aspect of the subject. The importance of delicacy in manipulation, exactness of diagnosis in position and presentation, and skill in operating are thus lost sight of.

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FIG. 1.—Kyphotic pelvis with caries and synostosis at iliosacral joints. Unfit for symphyseotomy. Comes from my first Cesarean section, 1882.

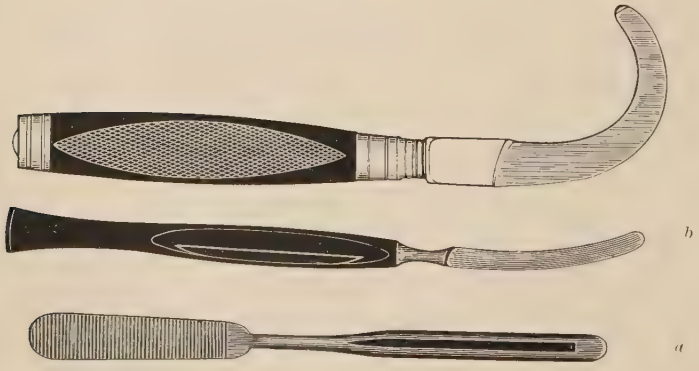

FIG. 2.—*a*, Hay's director; *b*, bistoury used in my symphyseotomy; *c*, Galbiati's falcetta.

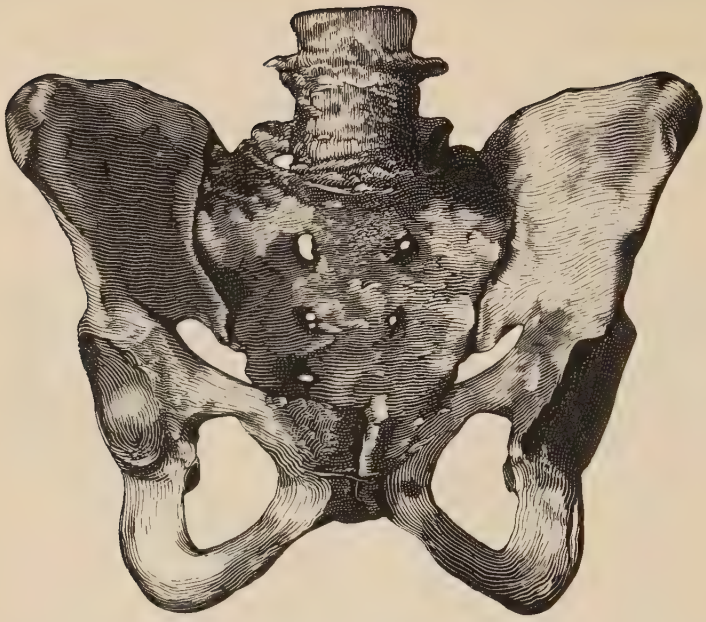

FIG. 3.—Generally contracted pelvis with male type. Difficult turning and extraction with perforation of after-coming head. Mother died of shock. Measurements exactly the same as in the case where I performed symphyseotomy, saving both mother and child.

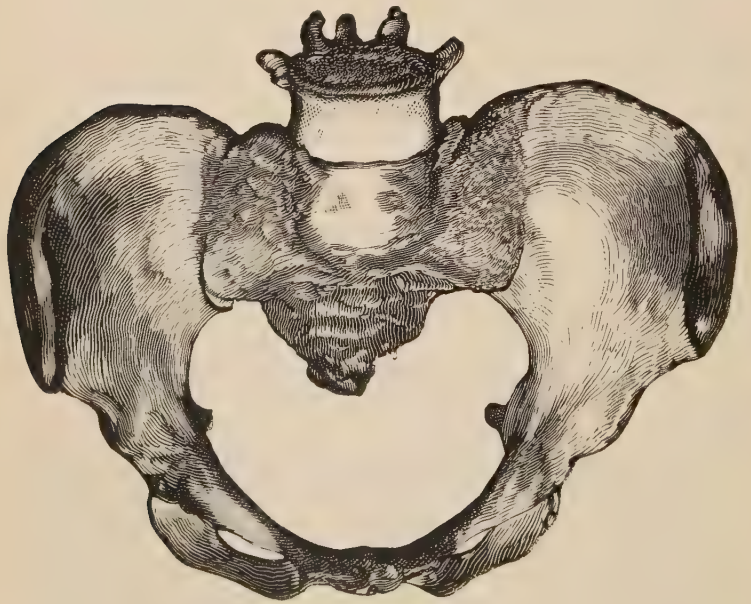

FIG. 4.—Same pelvis seen from above.

FIG. 5.—Cadaver of a woman at the end of pregnancy, the abdomen opened with a crucial incision. Shows the part of the abdominal wall where the incision is made in symphysectomy. (W. Hunter's gravid uterus.)

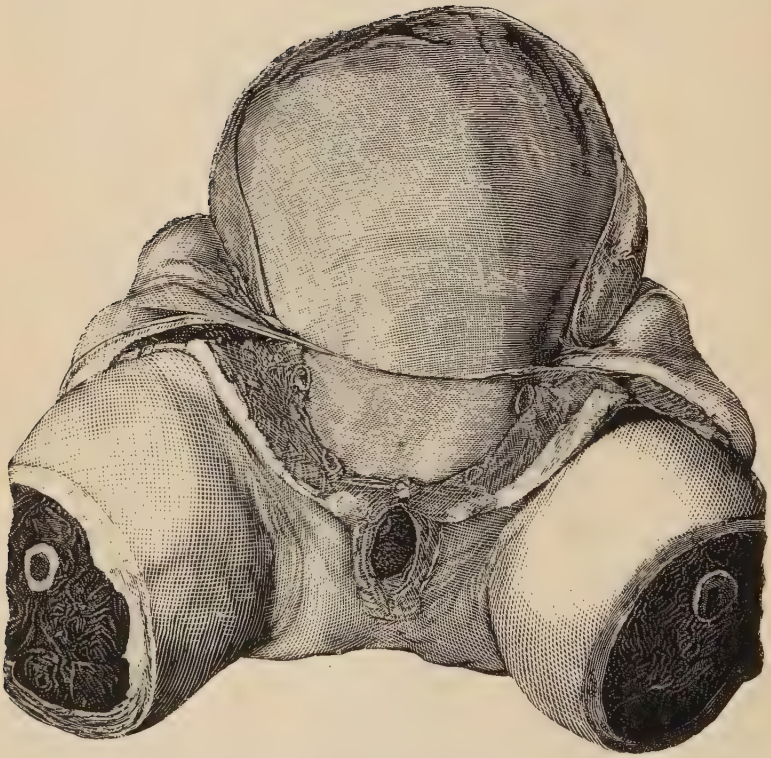

FIG. 6.—Same body after the removal of osa pubis and the muscles and integument covering them. Above the clitoris appears the bladder. This plate gives a good idea of the anatomical relations after the symphysis pubis has been cut. (William Hunter.)

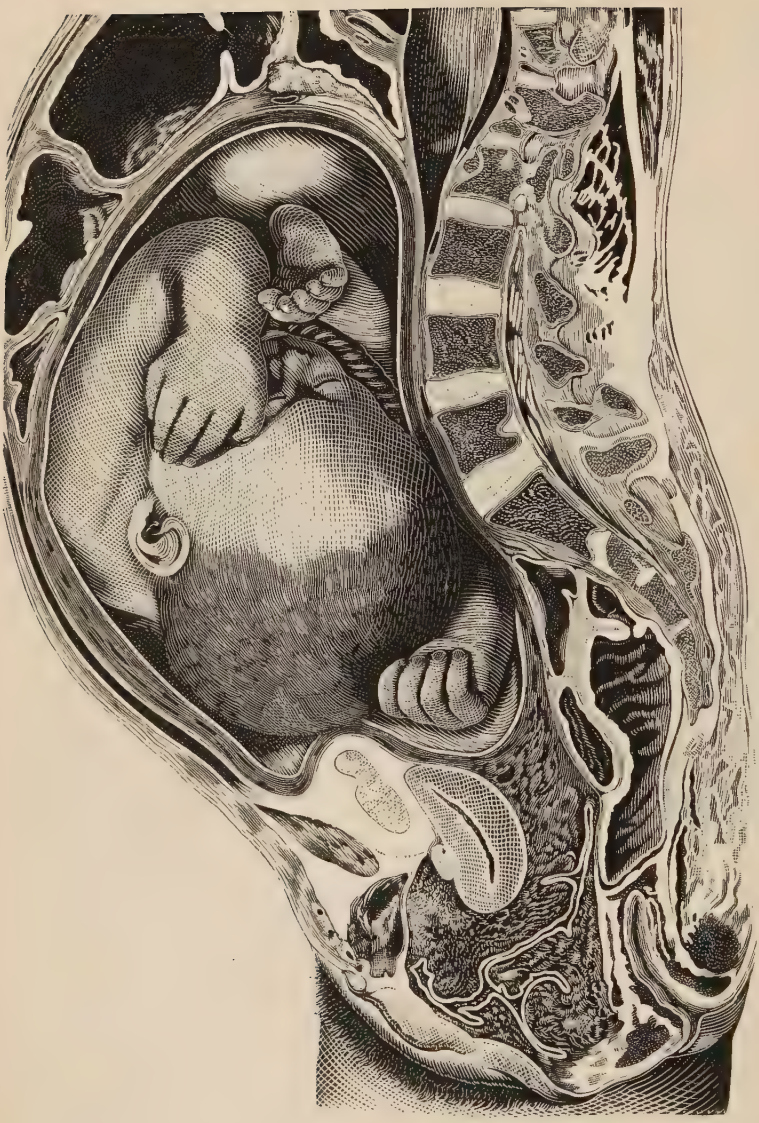

FIG. 7.—Longitudinal section through the middle line of a woman at term (Braune). Shows the tissues cut in symphyseotomy.

Fig. 8.—Longitudinal section through middle line of body of woman who died in second stage of labor. Shows how bladder is compressed between head and symphysis.

SYMPHYSEOTOMY.

By HENRY J. GARRIGUES, A. M., M. D., New York.

The distinguished honor which the president of the obstetric section of the Pan-American Medical Congress has conferred upon me by choosing me to address you on the point that occupies the minds of the greatest obstetricians of the world, more than any other at the present time, can not be due to my personal experience with the operation of symphyseotomy, since I have performed it but once,* but must be attributed to an indulgent appreciation of my studies, experiments, and writings on the subject. I shall not lose any of the brief time allotted to each paper by entering into the history of the operation further than to remind you that it was proposed in 1768, and performed for the first time in 1777, by the Frenchman Jean René Sigault, kept alive in Italy, especially through the efforts of Prof. Morisani, of Naples, and spread over the whole world by being adopted by Prof. Pinard, of Paris, in 1892. Since then it has been performed so many times that it is not possible any longer to keep track of all the operations their number probably being not far from two hundred. Of these, as far as known, 26 have been performed in the United States; 4 women died (equal to 15.39 per cent), 4 children stillborn, 4 died within three days (equal to 30.77 per cent).†

Space gained.—If the symphysis pubis is cut on the cadaver lying with outstretched legs, the ends of the pubic bones separate only about $\frac{1}{2}$ an inch (1 centimeter), but if we bend the lower extremities at the hip and the knee, this distance is increased to $1\frac{1}{4}$ or $1\frac{1}{2}$ inches (3 to 4 centimeters), and by pulling on the iliac bones it can easily be extended to $2\frac{3}{4}$ inches (7 centimeters) without injury to the sacro-iliac joints, which, like the symphysis pubis itself, becomes larger and more mobile during pregnancy. If the separation is carried still further a cracking sound is heard and rupture takes place in one or both sacro-iliac joints, the right giving way before the left.‡ This ought to be avoided, but if it happens, and no infection has taken place, the joints will heal.

By the separation of the pubic bones considerable space is gained in all directions. A gap is formed in front into which the presenting part enters. If the head presents, the eminence of the anterior parietal bone enters so much into this gap, that is has the same effect as if the true conjugate became $\frac{1}{4}$ to $\frac{3}{8}$ inch (6 to 8 millimeters) longer. The distance from the end of the pubic bone to the middle of the promontory increases at the maximum safe distance between the pubic bones of $2\frac{3}{4}$ inches (7 centimeters), more than $\frac{1}{2}$ inch (14 millimeters). The transverse and oblique diameters and every line drawn from the promontory to a point on the ilio-pectineal line in front of the transverse diameter increase from one-quarter to one-half of the distance between the ends of the pubic bones, which at the safe distance of $2\frac{3}{4}$ inches (7 centimeters) makes about from $\frac{3}{4}$ to $1\frac{1}{2}$ inches (17–35 millimeters). This great gain in space from side to side makes the operation particularly valuable in places where, like in New York and Boston, the most common form of narrow pelvis is the generally contracted, while the flat pelvis is of rare occurrence. Besides the gain in space obtained on the same level, the ends of the broken ring can be moved up and down perpendicularly, which may offer an additional help during the delivery of the child.

Limits and indications.—If we have to deal with a child of normal dimensions, we can easily calculate what degree of narrowness can be overcome by means of symphyseotomy. The biparietal diameter of the head being $3\frac{3}{4}$ inches (95 mm.), $\frac{1}{4}$ inch (6 to 8 mm.) entering in the gap between the pubic bones and the distance from the end of the pubic bones to the promontory being increased $\frac{1}{2}$ inch (14 mm.), $\frac{3}{4}$ inch

* Amer. Jour. Med. Sci., March, 1893.

† Letter from Rob. P. Harris, September 2, 1893.

‡ Döderlein, Centralbl. f. Gynäk., 1893, Vol. XVII, No. 22, p. 494.

(20 to 22 mm.) is gained in the length of the true conjugate. Taking furthermore into consideration the compressibility of the head, which is estimated at ¼ inch (6 to 7 mm.), we find that at a conjugate of at least 3 inches (75 mm.), we may expect an easy and safe delivery, and that the operation may be performed, although with difficulty, with a true conjugate measuring only 2¾ inches (7 cm.). If the child is small, we may even venture below this limit, Leopold having operated successfully with a conjugate of 6 cm. (2⅜ inches).* As to the upper limit for symphyseotomy it ought in a flat pelvis be placed at a true conjugate of 3½ inches (9 cm.) above which forceps or version offers the proper means of delivery. If the pelvis is generally contracted, I think the limit must be extended to 4 inches (10 cm.). Before symphyseotomy can intelligently be resorted to it must be preceded by accurate pelvimetry and by flexing the lower extremities in hip and knee joints and abducting the thighs, the accoucheur must satisfy himself that the mobility of the sacro-iliac joints is unimpaired. Furthermore, the cervix must be dilated or dilatable. Symphyseotomy may render good service under other circumstances than a narrow pelvis. It has been used in impacted occipito-posterior position,† in a case of pelvic tumor,‡ and to deliver a torn-off head in a case of tetanus uteri.§ It has also been used after the death of the child instead of embryotomy in a case of great contraction‖ and in a case in which extraction proved impossible after craniotomy.¶ It has been recommended for mento-posterior face presentations in which the chin can not be rotated forward.

Modus operandi.—A point of great practical importance is to decide on the best way of operating. At present two are used. Morisani makes an incision in the median line, 1½ inches (3 cm.) long and ending one-half to one-third inch (1 or 2 cm.) above the symphysis. Next he makes small transverse incisions into the pyramidalis muscle on either side so as to gain room for the introduction of the left index finger behind the symphysis, down to the lower end of it. Upon the finger he slides a strong sickle-shaped knife (Galbiati's falcetta), and cuts the subpubic ligament and the symphysis from below upward, and from behind forward. The open method was the original one of Sigault, has been reinstated by Pinard, and has been used by myself and most modern operators. A longitudinal incision is made in front of the symphysis and extended sufficiently above to have easy access to the latter and below to the root of the clitoris, or deviating to the left, while the urethra is carried with a metal catheter over to the right, into the vulva, between the labium majus and minus. My own incision was of the latter kind and measured 4 inches in length, the patient being a stout woman with a thick layer of adipose tissue on the mons veneris. Each of these methods has its advantages and drawbacks. The subcutaneous method recommends itself by its great simplicity; it gives rise to much less hæmorrhage in most cases, and the wound can be kept perfectly aseptic. On the other hand, if there is hæmorrhage at the bottom of this deep wound, it can only be treated with tamponade, which, although rarely, occasionally has proved insufficient. The open method allows the operator to cut in the way he finds it most easy, and the symphysis being much broader in front than behind, and having a well-marked notch at the upper end, it is often preferable to cut from the front backward, and from above downward. As hæmorrhage is especially likely to occur at the lower end, it is even an advantage to cut this part last. I cut from above and behind downward and forward with a common curved bistoury. The open method has, furthermore, the advantage that the operator can see where the blood comes from and can carry ligatures with curved

* Leopold: Centralblatt für Gynäkologie, 1893, No. 23, p. 547.
† R. A. Murray.
‡ Lepage.
§ Friederich Schwarz: Centralbl. f. Gynäk., 1893. Vol. XVII, No. 5, p. 84.
‖ Queirel: Centralbl. f. Gynäk., 1893, No. 24, p. 576.
¶ Beugnies: *Ibid.*

needles around vessels or oozing tissues. But, on the other hand, it has the drawback, if the incision is long, that lochial discharge bathes the lower end of the wound, and causes fever. Thus Zweifel, operating in a hospital with strictest antisepsis, had only 3 cases in 14 that were free from fever and often the temperature ran up very high as it did in mine.* If the soft parts are injured the open method may become necessary in order to repair them. If the symphysis is ossified and must be severed with a chain-saw, as has happened several times, I think the open method also becomes necessary in order to work the saw and remove the bone dust. Taking the pros and the cons into due consideration, I think that the next time I have the opportunity of performing the operation I shall try the Italian method first and only have recourse to the French if there is uncontrollable hemorrhage, if the repairs of injuries demand it, or the symphysis can not be cut. Even if we cut from above the sub-pubic ligament must be included in the incision as otherwise we do not gain space enough to let the child pass or the ligament is torn by its passage. As a rule, hemorrhage can be checked by tamponing the wound with iodoform gauze, if at the same time we tampon the vagina so as to get counterpressure from this side and the application of the two sides of the wound against each other helps also to check the bleeding. Sometimes it has, however, been necessary to tie arteries, veins, or the crura clitoridis on both sides. Another point of interest is to decide what is to be done after cutting the symphysis and arresting hemorrhage. Morisani leaves the further progress of labor to nature and uses forceps if it becomes necessary. In this he has been followed by Zweifel† who has waited as much as fourteen hours. If labor pains are present such expectation has undoubtedly great advantages both for mother and child. The cervix gets time to dilate, and the natural expulsive efforts will be less likely to hurt the child than any kind of artificial delivery. But if there are no labor pains, as in my case, the woman must be delivered at once. The patient and her friends may also object to leaving her in labor pains for many hours, aggravated by pain in the wound. She would have to be anæsthetized twice. In private practice it would be difficult for the operator to watch the case and be present at the right moment. Most obstetricians prefer, therefore, to deliver at once after severing the symphysis. In so doing I think we should be guided in the choice of the method of delivery by the rule to use version and extraction if the head is movable, and forceps if it is engaged in the pelvis. If the cervix is not sufficiently dilated incisions in it may lead to complete retraction over the head.‡ In regard to the closure of the wound there obtains great diversity in practice. Several go so far as to bore holes in the ends of the bones and unite them with silver sutures which are removed after ten days, as otherwise they would interfere with a repetition of the operation. This appears to me an unnecessary complication of the operation. Leopold§ recommends suturing the cartilage with buried silk sutures, which I and others have found impossible to do, because the cartilage is not thick enough to pass any sutures through it. Many unite the tendinous tissue in front of the pubic bones with such buried sutures, which I did, but I even doubt if that is necessary, when proper pressure is exercised on the trochanters. The soft parts, skin, and adipose tissue should under all circumstances be united by deep and superficial silk sutures, which are left in for a week or ten days. Drainage is superfluous. In order to keep the two halves of the pelvis together nothing is better than rubber adhesive plaster. I carried three straps 2 inches (5 cm.) wide round the trochanters crossing them on the abdomen above the wound. They were left on for 3 weeks and caused only slight excoriations while they gave no pain, kept the bones in apposition, and allowed us easily to lift the patient on the bed-

* Zweifel: Centralbl. f. Gynäk., 1893, No. 22. p. 498.
† Zweifel: *Loc. cit.*
‡ Eckstein: Centralbl. f. Gynäk., 1893, No. 19, p. 443.
§ Leopold: Centralbl. f. Gynäk., 1892, Vol. xvi, No. 30.

pan. While they are being applied and during after-treatment the patient should lie with outstretched legs, the knees kept together and the feet turned inward as this position of itself approximates the ends of the bones.

Maternal injuries.—Quite a number of operators, especially German, have reported considerable injury to the vagina, the urethra, and the bladder, which occurred in consequence of the tension to which the soft parts are subjected during the extraction of the child. The bladder may likewise be caught in approximating the pelvic bones, if care is not taken to push it back in closing the wound. In order to avoid the injuries due to tension it is advisable, in forceps extractions, to pull well back and rather risk a tear of the perineum or perform episiotomy than to expose the finer organs in front. To protect the vagina with a vectis-like instrument, as proposed by H. W. Freund,* will hardly be practicable. Even to place the hand in the gap between the bones, as recommended by Schauta,† seems to me to be more likely to increase the tension than to lessen it. The chief thing is to extract very slowly and in the right direction. If such injuries occur they should be repaired immediately with silk or catgut sutures. If there is a tear in the bladder it should be closed with continuous tier sutures, one applied to the mucous membrane, the other to the muscular coat and the peritoneum. If a vesico-vaginal fistula appears later it heals, as a rule, spontaneously and if it does not it can be closed by operation.

Prognosis.—Varnier‡ has in 124 modern operations found a maternal mortality of 9 per cent, but in the majority of cases death is not attributable to the operation. Properly performed and within the proper limits, I think the prognosis for the mother is very good, not only as to life, but also as to complete restitution. The gait becomes as perfect as ever. Pinard has not lost a case in 18 operations nor Zweifel in 14 operations. In Italy there have, from 1886 to 1893, been 48 operations with only 2 deaths.§ For the child the prognosis is more serious. Varnier, in the above-mentioned list, found an infantile mortality of 22.7 per cent. Very many are born asphyctic, and are not always revived. Some have had a fractured cranium during extraction with forceps or hand. This great mortality can doubtless be much diminished if we desist from all other attempts of delivery in cases in which symphyseotomy is indicated. It seems to me we expose both mother and child to unnecessary danger by trying to deliver with high forceps before performing symphyseotomy. The child may also be protected by having the iliac bones separated by assistants during extraction instead of using the child itself as a wedge to expand the pelvis All means of resuscitation must be kept in readiness and applied to the child if it is asphyctic. The combined mortality for mother and child in Varnier's list, after deducting 5 children that were dead before the operation, is 16 per cent.

Relation to other obstetric operations.—Finally, we will inquire what importance the revival of symphyseotomy has and whether it is called to change our obstetric practice and teaching. It is an operation that sometimes is so simple that a tyro can perform it; but at other times so difficult and complicated that no one should undertake it who is not qualified to perform a Cæsarean section. It is therefore eminently an operation for experts. It may, however, be performed in private practice as well as in lying-in institutions. For the mere medical obstetrician nothing is changed by the reintroduction of symphyseotomy, but for the operative obstetrician, the gynecologist, and the general surgeon engaged in obstetric practice the greatest changes are, in my opinion, to be made in the choice of operations by which we meet the mechanical disproportion between mother and child. Craniotomy on the living child or, what is still worse, expectation till the child is dead followed by craniotomy, ought never to be thought of in any community in which

* H. W. Freund: Centralbl. f. Gynäk., 1893, No. 23, p. 521.
† Schauta: Centralbl. f. Gynäk., 1893, Vol. XVII, p. 432.
‡ Amer. Jour. Med. Sci., July, 1893, p. 112.
§ Private communication from Dr. Rob. P. Harris, June 30, 1893.

it is possible to obtain the assistance of a man able to perform symphyseotomy. Induction of premature labor is only accompanied by about one-half of the maternal mortality of symphyseotomy—namely, 5 per cent—but then it has no less than 43 per cent infantile mortality,* that is a combined mortality of 24 per cent while in symphyseotomy it is only 16 per cent. In cases in which the mother's life is to be preferred induction of premature labor retains its position; but in cases in which the child's life is of particular importance, symphyseotomy is to be preferred. The infantile mortality being only about half as large as in induction of premature labor—22 against 43 per cent. By combining the two the limit of the induction of premature labor may be extended somewhat. Cæsarean section has a combined mortality of 16 per cent, the same as symphyseotomy and the infantile mortality is only two-thirds as large as in the latter—6 against 9 per cent.† But the maternal mortality is nearly three times as large—26 against 9 per cent. With proper respect for the mother's life there can, therefore, be no hesitation in regard to the preferability of symphyseotomy. Symphyseotomy competes even with Porro's operation, since it has been successfully performed when the woman had been for many days in labor, whereas Porro's operation is accompanied by the fearful mortality of 57 per cent. Any form of Cæsarean section ought therefore to be confined to the cases in which the coarctation goes beyond the limits for symphyseotomy. Even difficult forceps and version operations ought to be replaced by symphyseotomy, since these operations, when the true conjugate is less than 3¼ inches (8.5 cm.), entail much greater mortality for both mother and child and the latter, if it survives, is apt to become epileptic or idiotic. Symphyseotomy has already in several cases been successfully repeated on the same woman. It is evident that if the child were unusually large the operation would be indicated even with a normal pelvis. When great force is exercised in pulling on the forceps it sometimes happens that the symphysis is ruptured, cases that have a very good prognosis. How much more may we expect to see the woman recover if we substitute a methodical wound for the irregular tears and profound bruises resulting from forcible extraction and rupture? In my opinion symphyseotomy is a valuable addition to our obstetrical resources which ought to be performed frequently in maternities and in private practice.

HISTORIA DE DOS OPERACIONES CESÁREAS EN CHILE.

Por ADOLFO MURILLO,
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Con motivo del feliz resultado obtenido en una operación cesárea que practicamos en el mes de noviembre del año próximo pasado, nos ha parecido conveniente historiar los dos casos en que nos ha sido preciso practicar esta operación en nuestra ya bien larga práctica, ya que también nos parece que son las únicas operaciones de esta naturaleza aquí en Chile practicadas. En efecto, por lo que á nuestros profesores respecta, nunca los vimos que la hubieran hecho ni nos mencionaron caso alguno de que tuvieran conocimiento. Y si así no hubiese sucedido, nos daremos por muy contentos y satisfechos si logramos exhumar alguno más que pudiera contribuir á formalizar nuestra historia obstétrica en este punto.

Es un hecho perfectamente reconocido que las operaciones obstétricas, por graves estrecheces pelvianas, han sido en Chile y son bien escasas; y sólo ahora parece comienza á presentarse de tarde en tarde. La poca densidad de la población y las facilidades de la vida de que nuestros antepasados han gozado, parece explicar este fenómeno. La osteomalacia es entre nosotros desconocida y la raquítis una especie

* Wyder: Archiv für Gynäkologie, 1888, Vol. XXXII, p. 60.
† Caruso: Archiv für Gynäk., 1888, Vol. XXXIII, p. 255.

de *rara avis* que hace poco se ha atrevido á penetrar en nuestro cuadro nosológico. Poco común también han sido las afecciones vertebrales, que produciendo el mal de Pott alteran la columna y ocasionan las pelvis cifóticas y las cifo-escolióticas.

Las dos operaciones que vamos á relatar corresponden á dos épocas distintas, casi á dos diversas eras científicas.

La primera data de 1877, cuando la antisepsia quirúrgica nos era casi desconocida y no se practicaba en los servicios clínicos ni hospitalarios; cuando una operación de laparotomía constituía un gran acontecimiento y manifestaba el coraje casi imprudente de un cirujano osado y nada más; cuando la luz incierta del triunfo de la antisepsia clareaba en lejanos horizontes y su luz no alcanzaba á iluminar los Andes.

A esa primera era pertenece nuestra primera observación. Fué esa operación se puede decir feliz, por cuanto la enferma no sucumbió á la infección, sino que se estinguió suavemente al *shock* de una operación gravísima emprendida al quinto día del trabajo del parto en una mujer en quien las fuerzas estaban agotadas y cuando el feto principiaba á entrar en descomposición. La paciente sucumbía minutos después de pedir alimento y de sentirse mejor y al tercer día de la operación.

La segunda es llevada á cabo en la época de la antisepsia, y más principalmente de la asepsia quirúrgica, y cuando la cirugía abdominal ha hecho tantos progresos. En esta se tomaron precauciones y se llevó á cabo, siguiendo los adelantos realizados en una operación que ensancha cada vez más sus dominios, y á cuyo levantamiento han contribuido Porro, Sänger y la moderna escuela francesa. Aquí el útero es extraído, suturado, limpiado, casi desinfectado, y en seguida repuesto tal como debe hacerse, siguiendo lo que Potoski llama la operación cesárea moderna.

El éxito de esta segunda operación es por eso más seguro; y no hay nada de extraordinario en obtener de un feto vivo y en la sanidad de una mujer que sale de alta á los veinte y cuatro días de su operación. También el caso se prestaba para resultados favorables, ya que el parto principiaba, que las fuerzas de la parturienta se encontraban íntegras, que la dilatación no sobrepasaba de 4 centímetros, y que el feto se encontraba vivo y en las mejores condiciones de viabilidad.

En la relación que vamos á hacer de ambas observaciones, la primera aparece falta de datos que el tiempo nos ha ido borrándo de la memoria y haciendo perder nuestros apuntes, al paso que la otra solo se va á revestir del escaso tiempo que ha podido dedicarle nuestro ayudante para su redacción. Helas aquí:

Operación cesárea por raquítis al quinto día del trabajo del parto. Muerta al tercer día por shock. 1877.

En la tarde del día 12 de setiembre de 1877 llegaba á pedir una cama en la Maternidad X. X., de 31 años de edad, embarazada de término, y en el cuarto día de un penoso trabajo de parto. No pudiendo obtener mejoría en la calle viene al establecimiento en busca de alguna operación que la salve. Examinada con la debida detención, dice que no pudo andar hasta la edad de 9 años, porque fué muy enfermiza desde chica; que, según ha oido en estos días, el Dr. Sazie (Don Lorenzo), habia dicho en aquel tiempo que no podía tener familia, lo que probaba que en la infancia sufrió de raquítis. En efecto, á la sola inspección de las extremidades inferiores, se nota los caracteres distintivos de esta afección; los huesos de los muslos y de las piernas estan chuecos, tienen una gran inflexión; las articulaciones son gruesas y los piés se encuentran doblados hacia su parte interna. La pelvis está bastante deformada, siéndonos imposible dar sus dimensiones por habérsenos extraviado nuestros apuntes; solo conservamos el recuerdo y una observación puesta al márgen de otras notas, que el diámetro más angosto del estrecho no pasaba de 3 centímetros. El feto se mostraba de vértice y estaba muerto. No se pudieron percibir ruidos cardiacos, y el mal olor que principiaba, venía á dar más certidumbre á la muerte del producto de la concepción.

La operación cesárea se imponia como la única posible, ya que la introducción de cefalotribos y su manejo iban á estar impedidos por estrechez tan considerable.

Decidida la operación se practicó en la mañana del día 13, por cuanto carecíamos de los elementos necesarios para practicarla la noche misma de su ingreso. No hubo aquí método antiséptico empleado: fué solo la limpieza la que hizo el gasto.

Cloroformada la paciente, se abrió la cavidad abdominal, y nos encontramos, á más de un edema bien pronunciado de las paredes, con la vejiga vesical llena. Feliz-

mente no fué tocada por el bisturí. Uno de los ayudantes, á quien había confiado esta operación antes de poner á la paciente en la cama de operaciones, tuvo la mala idea de no informarnos de que no había podido introducir la sonda. La impresión que la cabeza fetal egercía sobre la vegiga, le había impedido penetrar. Extraigo con rapidez la orina, empujando la cabeza y usando una sonda metálica para hombre, sale más de medio litro de orinas.

Es conducido el útero al medio de la incisión abdominal y es enderezado, á la vez que se aplican las paredes del vientre á sus costados para impedir la caida del agua del amnios y de la sangre en la cavidad del abdomen. Practico la incisión con un bisturí y tengo la fortuna de no encontrar la placenta en mi camino. El feto es extraído con cuidado, y en seguida desprendo la placenta y las membranas. La pérdida de sangre es poca y no obliga á ligadura alguna.

Inyección hipodérmica de ergotina que repito á los diez minutos. Reducción del útero sin ligaduras; la retracción se hace con regularidad y detiene la escasa aparición de sangre. Sólo un punto del útero es tocado con la tintura muriática de fierro ó con una fuerte solución de ácido fénico (no recuerdo con cual de ellas) practicándose en seguida las ligaduras.

Para el afrontamiento de las paredes abdominales, practiqué seis ú ocho grandes súturas superficiales célulo-cutáneas. Curación con glicerina fenicada; vendaje de cuerpo.

La operación duró hora y cuarto.

El feto era de sexo masculino y pesó 2,800 gramos.

Día 13, 11 a. m.: Temperatura 36°, pulso pequeño y frecuente. Aplicación de cubiertas calientes; botellas calientes; cordial anodino.

5 p. m.: Temperatura 37°, pulso 130. El calor se ha difundido por todo el cuerpo, sudor abundante en la cara. La paciente se encuentra mejor y está tranquila.

Se la ordena por la noche la siguiente poción: Agua, 100 gramos; hidrato de cloral, 2 gramos; alcoholatun de acónito, 2 gramos; jarabe, 20 gramos. M. Para tomar una cucharada cada tres horas.

10 p. m.: Temperatura 37°, pulso 130; sudor algo frío; uno que otro vómito; orina sola.

Día 14: La enferma ha dormido algunas horas; ha estado tranquila. Sólo se ha quejado de una ligera molestia ocasionada por una capa de hielo que se le ha hecho colocar en el abdómen para evitar la inflamación peritoneal, en conformidad á las ideas reinantes de la época.

8 a. m.: Temperatura 37°, pulso 140. En la mañana ha tenido uno que otro vómito, debido al parecer á la cantidad de agua que se le ha permitido beber. El vientre un poco meteorizado.

Más tarde se le permite tomar pequeñas porciones de caldo ó de leche.

La nocne es tranquila.

Día 15: Amanece bien. Se renueva la curación.

Á la 1 p. m. la paciente pide leche. Al regresar la enfermera la encuentra agonizante y fallece en pocos minutos.

La autopsia nos muestra el útero retraído; no hay en el peritóneo exudación ni signos inflamatorios.

Á nuestro modo de ver, la operada ha fallecido bajo la influencia de un choque profundo, una especie de sideración nerviosa, debida á un trabajo muy prolongado y á una operación grave en una persona debilitada y abatida.

PELVIS CIFO-ESCOLIÓTICA. OPERACIÓN CESÁREA. FETO VIVO. CURACIÓN. OBSERVACIÓN RECOGIDA POR EL DR. DON CÁRLOS GUTIÉRREZ, AYUDANTE DEL SERVICIO CLÍNICO.

N. N., soltera, de profesión cocinera, de constitución raquítica, de 25 años de edad, natural de . . . , entró el 28 de noviembre de 1892 á ocupar el número 18 de la Maternidad, servicio del Dr. Murillo.

La causa de la admisión fué el estado del trabajo.

Los antecedentes anamnéticos de la enferma eran los siguientes: Primipara, de menstruación regular; había tenido sus últimas reglas en febrero de 1892 y durante su embarazo ninguna novedad. Los dolores habiánle principiado en su casa el día anterior, 27, al anochecer, continuándose con regularidad hasta la hora de su ingreso, 9 a. m.

Como no adelantara el parto, la matrona le aconsejó su venida á la Maternidad.

Añade que, cuando niña de 3 á 4 años de edad sufrió un golpe que le produjo la deformidad de la columna vertebral. Su salud ha sido delicada.

EXAMEN DE LA ENFERMA.

El aspecto de la mujer, su estructura pequeña, su claudicación, todo nos revela en ella una persona raquítica.

La cara es angular, los pómulos salientes, teniendo su rostro un sello especial que imprime el desarrollo anormal del esqueleto.

La columna vertebral es irregular, presentando las deformaciones de la cifosis y de la escoliosis, como indicaremos más adelante.

Palpación abdominal.—El vientre presenta la disposición característica designada con el nombre de *vientre en obús*. Las paredes abdominales son delgadas y podríase fácilmente diagnosticar, palpando, que la presentación es de vértice.

El tumor formado por la cabeza fetal se toca por encima del estrecho superior.

El útero está inclinado hacia la derecha. La cantidad de líquido amniótico es regular. El tamaño del tumor uterino indica una preñez de término.

Auscultación.—Los latidos fetales, claros y distintos, se oyen en el lado derecho, por debajo de la línea umbilical.

Tacto vaginal.—La vulva es estrecha. La enferma acusa dolor á la introducción de los dedos índice y medio. La vagina misma se nota angosta. Los dos dedos paralelos en su dirección horizontal no pueden franquear el estrecho inferior. Las tuberosidades isquiáticas lo impiden. Siguiendo el tacto con el índice tan solo se puede alcanzar el cuello, el que está muy hacia atrás animado al fondo del saco posterior. Con el extremo de este dedo no se alcanza á tocar el promontorio. La dilatación del cuello es de 4 á 6 centímetros. La bolsa de las aguas está intacta.

EXAMEN FÍSICO.

Altura de la enferma, 1 metro 20.

Columna vertebral: Presenta dos incurvaciones. En la región dorsal presenta el tumor caracteres de la cifosis, y en la parte lateral la estrechez es de tal naturaleza que hace clasificar la enfermedad que nos ocupa como cifo-escoliósica. Pecho deprimido en su parte superior. El apéndice xifoides parece pronunciarse.

Miembros: Presentan incurvaciones dependientes del raquitismo. Son delgados, sus curvas flácidas.

PELVIMETRÍA EXTERNA.

[Centímetros.]

Diámetro ántero-posterior:	
(*a*) De la apófisis espinosa de la última vértebra lumbar al borde superior de la sínfisis. Conjugado esterno ó diámetro de Baudelocque	23
Diámetros transversos:	
(*b*) De una espina ilíaca anterior y superior á la opuesta	22
(*c*) De una cresta ilíaca á la otra	25½
(*d*) Bi-trocantereano	27
(*e*) De una espina ilíaca posterior y superior á la opuesta	7
Excavación. Estrecho inferior:	
Entre los dos fondos de la cavidad cotiloidea	5
Coxígeo-subpubiano	6
Bi-isquiático	3.5
Altura del pubis	5
Espacio del pubis	2

PELVIMETRÍA DIGITAL.

El diámetro conjugado del estrecho superior tiene 11 centímetros. El sub-pubis 12.5. El oblicuo izquierdo por las enseñanzas del índice se puede apreciar que es un poco mayor que el derecho.

Los del estrecho superior son los arriba apuntados.

Una vez verificado el exámen prolijo de la enferma, se accordó en vista del grado de la estrechez que imposibilitaba la extracción, aún por aquellos medios que más reducen los diámetros del feto, practicar la operación cesárea á las 3 p. m. del mismo día.

PREPARATIVOS.

(*a*) *Desinfección de la sala operatoria.*—Pisos, paredes y suelo fueron lavados con la solución fenicada al 50 por 1,000; acto continuo, cerrando herméticamente todas las puertas y ventanas se la sometió á la acción prolongada del ácido sulfuroso.

La temperatura á que se mantuvo la sala durante la operación fué de 28°. La saturación de la atmósfera se obtuvo mediante el funcionamiento de dos *sprays* hacia el medio de la sala, aparato que dirigia un chorro de vapor fenicado hacia arriba.

(*b*) Desinfección de la enferma. En la mañana se la hizo tomar un baño de cuerpo entero.

Evacuación del recto por medio de lavativas boratadas.

Desinfección prolija de los órganos genitales externos con solución fenicada al 3 por ciento. Inyección vaginal con creolina al medio por ciento.

Se le hizo el cateterismo de la vejiga y por último después de razados los pelos abdominales y pubianos, se lavó el abdómen primero con jabón y cepillo, sublimado

al uno por mil, después con éter, y en seguida con alcohol absoluto. Para evitar trato ulterior se colocó compresas sublimadas sobre el abdomen.

Instrumentos.—Se les sometió durante una hora al calor seco y fueron después colocados en la solución fenicada al 5 por ciento.

El catgut, seda y esponjas usadas en la operación estaban preparados de antemano mediante riguroso procedimiento antiséptico.

OPERACIÓN.

Esta principió á las 3½ p. m., terminando una hora después. Los Doctores Amaral, Frias y otros la presenciaron.

Narcotizada la enferma y estando seguros de que entre la pared abdominal y el útero no se interponía ningún asa intestinal se practicó una incisión en la línea alba de 15 centímetros.

Era tan delgada la pared abdominal, que del primer corte con el bisturí se llegó al plano del peritóneo; reconocido este, previa abertura de un ojal, se le abrió con la tijera hasta igualar con la herida externa. Inmediatamente apareció á nuestra vista el útero con su color azulado lívido, surcado por gruesos vasos venosos.

Este hallábase inclinado hacia el flanco derecho, pudiendo verse facilmente hacia el lado izquierdo los ligamentos anchos, y las trompas que por la torsión de la víscera estaban inclinados hacia el plano anterior. Lo primero que hubo de hacerse fué modificar esta inclinación trayendo al frente de la herida abdominal la parte media de la cara anterior del útero.

Hasta este momento la pérdida sanguínea era insignificante. Dos á tres pinzas habían bastado.

El peritóneo se fijó también con pinzas, para facilitar posteriormente su sutura.

Incisión uterina.—Manteniéndose por los ayudantes bien aplicadas las paredes abdominales al útero para evitar así la introducción de sangre ó de líquido amniótico al interior de la cavidad peritoneal, se hizo una incisión vertical de 13 centímetros de largo en la parte media de la cara anterior.

Atentos á la hemorragia los ayudantes colocaban pinzas en los ramos arteriales gruesos.

Rotas inmediatamente las membranas, se presentó á nuestra vista la pelvis y los miembros inferiores de un feto de término. Su extracción se hizo rápida y con toda felicidad tratando el operador de presentar á los menores diámetros fetales en sentido transversal y haciendo dar, por último, á la cabeza movimientos, al desprenderse, fijándose al pubis como en un parto normal.

Sin accidente el que menor trascurrió este difícil tiempo de la operación. Luego se ligó y cortó el cordón. Este niño ha estado cuidado de un ayudante y de la matrona.

La placenta, cuya inserción encontrábase en la cara posterior y hacia el fondo, se extrajo normalmente.

Inmediatamente después de esta extracción vino una fuerte contracción del útero.

La cavidad del útero se limpió bien con esponjas asépticas y con agua esterilizada.

La hemorragia fué poco abundante.

Afirmar se puede que la operada perdió menos sangre que en un parto normal.

Permeabilidad del cuello del útero.—Desembarazado el útero de todo coágulo y limpiada su cara anterior por medio de compresas con agua esterilizada se procedió á efectuar las suturas uterinas.

La contracción del útero había ya reducido á 8 centímetros la incisión y las paredes que al corte presentaban un espesor de 8 milímetros habían adquirido un espesor triple de 25. Esta misma contracción había disminuido mucho la sangre.

Sutura uterina.—Se practicaron 8 suturas profundas entrecortadas con seda fuerte. Ninguna vez se desgarró el tejido uterino.

La sutura del peritóneo visceral hecha con catgut, fué continua.

Sutura abdominal.—Sutura peritoneal continua con catgut. Sutura de los planos músculo-aponeuróticos.

Aquí no hubo necesidad de hacer suturas profundas, vistolo en extremo delgado de las cubiertas abdominales.

Después de un lavado cuidadoso de la enferma, aplicación del apósito y vendajes, se la trasladó á su cama, en donde se le abrigó convenientemente. Cantidad de cloroforme empleada, 60 gramos.

Ergotina, 2 gramos; solución Dusart.

Día de la operación, temperatura, 37.2°; 28 de Noviembre, 37.2°. Duerme tranquila.

29. A las 4 a. m., vómitos biliosos; vientre un poco meteorizado. Se le aconseja tomar trocitos de hielo y champaña helada. Temperatura, 37.5°, 37.2°, y 37.2°; pulso, 100, 100, y 100.

30. Los vómitos continuan. La enferma ha dormido sin embargo. El meteorizmo

del vientre ha aumentado. Champaña helada; hielo; leche; una inyección de ergotina. La enferma acusaba la existencia de un tumor cerca del ombligo. Utero bien contraído. Duerme tranquila á esta hora con toda regularidad. Temperatura, 36.9°, 37°, y 37°; pulso, 80, 100, y 110.

Diciembre 1. Los vómitos siempre la han molestado, pero mucho menos por los días anteriores. El meteorizmo disminuye. Temperatura, 37.3°, 37.3°, y 37°; pulso, 110, 100, y 120.

Diciembre 2. El estado de la enferma es muy bueno. Siente solo mucho apetito. Se le permite tomar helados de leche. Temperatura, 37.5°, 37.8°, y 37.8°; pulso, 90, 100, y 100.

Diciembre 3. Sigue muy bien.

Por mi parte solo tendré que agregar á esta observación, tan bien detallada, dos cosas:

La primera es la confirmación habida en este caso del signo de Leopold para conocer si la placenta está invertida ó no en la cara anterior del útero. La proximidad de las trompas por la cara anterior existía aquí y la placenta se encontró en conformidad con lo dicho por este profesor, en la cara posterior. Si las trompas hubieran estado aproximadas por la cara posterior, signo habria sido de otra colocación del órgano vascular útero-infantil.

Las ligaduras uterinas fueron practicadas con seda. En la primera, ó sea la muscular, comprendió la mucosa uterina, que habíase limpiado con cuidado. Del afrontamiento fácil que obtuve colegí que es inútil seguir el procedimiento de oblación de la pequeña rebanada que aconsejaba Sänger. En la peritoneal ó serosa comprendí la parte superficial del músculo uterino para mantener más segura lo cooptación de las superficies afectadas.

Todas las suturas, exceptuando la de la serosa peritoneal-abdominal, fueron practicadas con seda. He elegido esta sustancia para evitar hemorragias, flojedad de los nudos y por su mayor comodidad. El hecho de no haber tenido molestia de ningún género en la convalecencia, me ha decidido para continuar usando en lo futuro como la mejor materia en las suturas.

Los progresos tan admirables llevados á cabo en la cirugía abdominal, de lo cual es una prueba nuestra última observación, abren un ancho horizonte á la obstetricia y permitirán á los comadrones ser más atrevidos en los casos difíciles. Ojalá llegue un día en que la embriotomía no sea practicada en fetos vivos ni menos aconsejada! La humanidad lo reclama.

DISCUSSION.

Dr. Haehnlen, of Philadelphia, said: Never having had an opportunity to perform this operation I can only speak from what I have seen done by others and my reading of the literature on the subject. I firmly believe that symphyseotomy is an operation of great value in obstetrics and that by it we can deliver a living fœtus in many cases where ordinary forceps delivery or that by version would be of no avail. Further, I am convinced that many cases upon which Cæsarean section has been performed might have been delivered by symphyseotomy had the operation been more fully understood. Of course I do not mean to say that this operation will ever take the place of Cæsarean section or its modifications for its range is limited to a little over half an inch. I was surprised at Dr. Price's comment on this operation when he claimed that he could deliver with the forceps any women that could be delivered by symphyseotomy. If Dr. Price could do this I believe he possessed obstetrical skill unknown to anyone else; but as this is scarcely the case I must therefore consider his remarks as rather far-fetched and not to be confirmed by results. Having heard but the closing remarks of this most excellent paper of Dr. Garrigues I am not in a position to discuss it, but would say that if I had a case in which symphyseotomy was indicated, I should employ pretty much the same line of treatment as that laid down by Dr. Garrigues; for it seems to me that it would be hard to improve on his methods or technique.

Dr. H. T. Nelson, of Virginia, came to learn at the feet of the eminent men present, but could not do otherwise than commend the paper of Dr. Price. Is an earnest advocate of strict asepsis in obstetric practice. He formerly lost patients from what was said to be *cold;* he now knows these patients died *septic* and is satisfied that women might be delivered outdoors in storm and rain provided that thorough cleanliness be observed. It often puzzled the doctor when to use the forceps; not in those cases of contracted pelves, uterine inertia, or dystocia, but when the fœtal head came down upon the perineum and violent, continuous, and exhausting pains failed to complete the labor except after hours of suffering. He has now come to believe that if there is no advance to the head after two or three such pains the proper course to pursue is to complete the delivery with the short forceps. The patient suffers less from *shock.* Some twenty years ago, before the doctor had ever heard of axis traction, in a peculiarly difficult case where he had failed to extract the child with Hodge's forceps he had passed his handkerchief through the *fenestræ* of the blades *in situ* and by pulling on this, present traction principle somewhat, had delivered the child without much difficulty.

Dr. Salvador Fundujo. Ex profeso omití hablar de la sinfisiotomía como uno de los medios de subsanar los inconvenientes en el caso presentado, tanto porque no conozco la estadística comparativa entre ella y el parto prematuro bajo la influencia de la asepsia y antisepsia, como porque la sección de la sínfisis pubiana aumentará los diámetros pelvianos, pero sin corregir el defecto anatómico del pubis que se opone al paso de la cabeza del feto por el estrecho superior; porque sólo se habrá cambiado la forma del obstáculo, y en vez de un caballete rígido, habrá dos espolones huesosos, cuya separación vendrá á aumentar por las tracciones del forceps aplicado arriba del estrecho, aplicación difícil y á la cual deberá recurrirse previa la sinfisiotomía, cuando el partero sea llamado en los momentos del trabajo; pero si es consultado durante el embarazo, creo de mejor éxito el parto prematuro.

Dr. Harris. Never having performed this operation I can not speak from experience. I can only speak from what I have read, and can not do any better than confirm Dr. Garrigues's views on the subject. If I were to meet with a case requiring symphyseotomy I would unhesitatingly operate believing, as I do, that this operation has its place in obstetrics, notwithstanding the assertion has been made to the effect that any case that can be delivered by this operation can be equally well delivered by the forceps. This, of course, I do not believe and I think my position in the matter will be generally indorsed by most obstetricians.

Dr. De Saussure desires to join with Dr. Haehnlen, of Philadelphia, in protesting against the assertion of Dr. Price, of Philadelphia, that a high-forceps operation will do all that symphyseotomy can do and he begs for an early operation in the the name of mother and child. If this operation is delayed the mortality must be high.

Dr. Gutierrez approves in full the opinions of Dr. Garrigues, and deducts three important indications from his very interesting study: Symphyseotomy in mento-or occipito-posterior presentations and its forestalling embryotomy in the case of a living fœtus, which is a proceeding decidedly unworthy of the age in which we live.

Dr. Charles P. Noble, of Philadelphia. The subject of symphyseotomy being new and its claims being of such practical importance, the interest of all progressive practitioners has been excited, so that in the near future the status of the operation will be settled by the large experience which is now accumulating. It seems to me that Dr. Garrigues's estimate of the dangers of symphyseotomy, and also that of the Cæsarean section, the Porro operation, and the induction of premature labor, is much too high. He has followed the current custom of collecting the results of skillful men, and combining these with results of untrained men. Also the results when the operation was done under proper conditions, with results when it was done after the failure of other misdirected measures. Hence his statistics do not represent the mortality of the operations, but of the medley of operators good, bad, and

indifferent. When done *secundem artem* all these operations should have a mortality approaching zero. I believe that the chief merit of symphyseotomy is that it will do away with the deliberate killing of the human fœtus, politely called embryotomy. The modern Cæsarean operation should have done away with elective embryotomy, but the prejudices of the profession and the public concerning the dangers of that operation prevented its substitution for craniotomy. But now the advocates of embryotomy will grow less and less, as the dangers of symphyseotomy are confessedly scarcely, if at all, greater than those of embryotomy. Another good which will be accomplished is that it will take the place of delivery by violence or brute force. Heretofore when the disproportion between the head and the pelvis has not been great it has been a choice between embryotomy and a more or less violent delivery. The result has been a large number of dead and of "spoiled" babies—babies with injured heads, who later become the subjects of palsies, or of arrested cerebral development and at times the inmates of homes for the feebleminded. Symphyseotomy, I believe, will largely, but not entirely, supplant the Cæsarean and Porro operations. It will find its chief field of usefulness in pelves having a conjugate of 3 inches or more, with a lower limit of 2¾ inches, whereas the field of the Cæsarean operations will be in cases with a conjugate of 2¾ inches or less, and cases in which the obstruction is due to the germ of a tumor, etc. In the case of symphyseotomy in which I was the operator and also in one in which I was consultant the subcutaneous, or Italian, method of operating was employed. As the Italians have had better results than either the Germans, French, or Americans, I feel inclined to follow their technique. Dr. Garrigues objected to the subcutaneous method on the ground that it would be difficult to control hemorrhage. I believe that the veins about the urethra and vestibule are less likely to be cut when the subcutaneous method is used, as they are pushed aside by the finger and the blunt point of the Galbiati knife; and, moreover, it would be a simple matter, if really necessary to control hemorrhages, to lay open the tissues in front of the pubes. This could as easily be done late in the operation as at the beginning. I doubt, however, whether a careful operator will be called upon to do this.

THE AMNIOTIC FLUID, ITS USES, ETC.

By WM. P. HOGUE, M. D.

[A healed non-closure of the abdomen shown.]

The membrane nearest to and surrounding the fœtus is called the amnion. It contains a fluid known as the amniotic fluid or liquor amnii. In the beginning of pregnancy, when the quantity is small, the membrane or sack resembles a small bladder, the liquid within is clear, presenting the appearance of white of egg, but as it increases in quantity it becomes less transparent. From half a pint or less to a quart or more is met at the time of delivery. The general supposition is that it is a secretion from the internal surface of the amnion, though the opinion has been expressed that it was secreted by the inner surface of the uterus and passed through the membranes into the amniotic sack. Meckel thinks that in the earlier months it is derived from the maternal vessels.

An analysis at the fifth month of gestation and at the full time by Prof. Scherer showed:

	At five months.	At nine months.
Water	975.84	991.474
Solids	24.16	8.526
Albumen	7.67	0.082
Extractive	7.24	0.060
Salts	9.25	7.006

This shows that at the end of gestation there was an increase of water with a diminution of all the other constituents.

As to the uses of the liquor amnii, all appear to agree that its principal use is to protect the fœtus. Surrounded by and floating in this liquid, it is evident that the danger from shocks, blows, or falls is greatly lessened. Another part which by some it is thought to perform is to aid in the growth of the fœtus. Churchill says: "It is probable that it serves for nutriment to the fœtus at least during the early months." Dunglison, in his dictionary, after saying it contains water in considerable quantity, albumen, chloride of sodium, phosphate of lime, an alkaline substance, and a particular acid, adds: "It is probably inservient to useful purposes in the nutrition of the fœtus." Stewart, in his Obstetric Synopsis, says: "It contributes to the nourishment of the fœtus." On the other hand, Ludlow, to the question, "Does the liquor amnii contribute to the growth of the child?" answers, "No." Here is a difference of opinion. In support of the supposition that a part at least of its office is to assist in the growth of the child, let me here give a short account of one or two cases that came under my own observation.

Mrs. H., who was the mother of several children, supposed herself to be pregnant. The usual signs of pregnancy showed themselves until the time of quickening arrived, when she found the signs of life were wanting. She continued to increase in size until her ninth month, or probably a little longer, during all of which time she felt no signs of life. I told her I thought the womb contained a large amount of liquid and perhaps some of those unnatural growths that we sometimes meet and which are generally delivered without harm to the patient. When sent for to deliver her, I found her sitting up; the water having broken and run in a stream across the floor. Upon examination I found the womb contained a fœtus, the left foot of which extended a little below the os uteri. From the time I was told the waters had broken until regular labor pains commenced there was an interval of two or three hours. After the pains commenced the labor went on very well and I delivered her of a fœtus the time of uterogestation of which, judging from its size and appearance, was about four months or a little short of the time at which quickening should have taken place. [Here I will quote from a paper I prepared for our West Virginia Medical Society, and which was published in its transactions.] "The child or fœtus showed a great want of development; arrest of growth would probably in this case be the more suitable expression, as the word development is connected with and aids in determining the age of the fœtus. All the front portion of the abdominal wall was wanting exposing to view the bowels, stomach, and liver. On the back of the neck and down to the upper part of the back a large opening exposed the vertebra and, as well as I recollect, the cerebellum, or a part of it protruded down into the upper part of the opening. The upper part of the skull was deficient and the right leg was shorter than the left. I give this description mainly for the purpose of showing that its age could not be very well determined by its development. There were no signs of decomposition either by its appearance or by the odor emitted. Now from the time of the death of the fœtus or I might say from the time it failed to come into existence until its delivery, about five months elapsed. During this time the liquor amnii steadily increased in quantity, and the fœtus was preserved from decomposition. It may be asked if this fluid possesses such preservative qualities, why, then did the fœtus fail to live? Death may have been caused by some error in other maternal vessels, but I think as in spina bifida when the fluid is removed from around the cord the irritation that sets in proves fatal; so the exposure of the spinal cord in this case may have interfered with and gradually checked the vital process. The os and cervix being closed or sealed as in natural pregnancy air could not be admitted to produce decomposition. According to the analysis made at five months and that at full time, it was found that in the latter the proportion of water had greatly increased. It may be this increase adds to its solvent properties, especially in removing the material that so firmly closes the cervix and os. Having become thinner, it would more readily pass through the membrane to reach and soften the obstruction."

In another paper which I read before the Medical Society of West Virginia I gave an account of a child born with non-closure of the abdomen. He had been born about an hour and a half when I reached the house. I found an opening at the umbilicus a little larger than a silver dollar or about one and three-quarters of an inch in diameter, the edges of which were corrugated, but smooth and shining. Through this opening all the bowels had passed and were lying in a mass on the pubis and thighs. I replaced them leaving the funis out with the thread tied on it by the midwife. Then, drawing the edges as close as I could, I put a number of strips of court or isinglass plaster across it in all directions, enough of them and

close enough together to exclude the air. Upon removing the strips about four weeks after, the opening was found to be completely closed. The question now arises: Why did it close? Did adhesive inflammation set in and cause the parts to adhere to the omentum?

The cavity of the abdomen was full to overflowing with a liquid which I think was the amniotic fluid. Could this fluid have any effect in causing the parts to unite after birth as they are known to unite before birth? Since this occurred the great progress made in abdominal surgery might justify the performance of an operation. In November, 1888, Dr. Dorsett, of St. Louis, operated on a case somewhat similar to this but as it appeared to be a forlorn hope it is not surprising that it proved to be unsuccessful.

Children have been born with parts of one or more of their limbs absent. This is termed intrauterine amputation and is supposed to be caused by constriction of the limb by folds or bands of the amnion or by the umbilical cord. In some supposed-to-be recent cases the severed part is expelled at the birth of the child. In others, where the amputation was earlier, no trace of the limb can be found. It appears to have melted away showing that the liquor amnii possesses solvent qualities. Now, if the growth and preservation of the fœtus gives us the liberty of believing that it possesses nutritive qualities, let us see what benefit might be derived from its use in the healing art, either in its natural state or as an artificial preparation possessing the same constituents as shown by analysis. Recent discoveries show that certain animal juices possess hygienic and physiologic effects. Note the experiments of Brown-Sequard, for example, and again, the use of the juice of the thyroid gland in myxedema; that form of dropsy in which there accumulates in the body a thick, jelly-like liquid. The white of egg surrounding and protecting the yolk is somewhat like the liquor amnii surrounding the fœtus.

In domestic practice the skin or membrane lining the shell with some of the albumen or white attached is placed on hard and painful swellings to soften or discuss them. Now we know the remarkable softening and relaxing powers possessed by the liquor amnii when furnished for the purpose the Creator designed it and we may readily suppose if it or an artificial equivalent was applied to hard and malignant swellings or to contracted muscles or tendons that the effect would be the same though in a less degree and that no harm would result from its use, especially if antiseptic rules were observed. Again we see children at birth plump and to all appearance healthy; but they soon show that they are declining, so much so that at the end of a month or two they have an old and shriveled appearance and will hardly weigh as much as they did when first born. We think the mother's milk does not agree with them and advise the use of cows milk. This is no better. We then recommend some of the artificial foods for infants with no better success. I have sometimes told mothers to let the babe suck a piece of meat, either salt or fresh, and to continue to try different things until something could be found that would agree with it. This is inanition. Now, if the child before birth, receiving nourishment from the mother and floating in the amniotic fluid is plump and healthy; and then after birth still receiving nourishment from the mother begins to decline, is it unreasonable to suppose that if the fluid or a preparation containing its constituents was applied to it externally that it would be improved by it. This substance might act either as a nutrient direct or by producing such an effect upon the system that the mother's milk or other food put into the stomach would agree with the child and restore it to the healthy condition that it was in at the time of birth? It might also be used to bathe those premature children in which the "hatching box" or artificial gestation has been employed. My rule with premature children is to tell the nurse not to wash the liquor amnii and vernix caseosa from them; but to let it dry on them to serve as a protection to the thin and delicate skin and perhaps prevent the oxygen of the atmosphere from too highly oxygenizing the blood. Not being in a position to furnish positive proof, I offer these suggestions with the hope that some one better prepared may take them up and ascertain whether they possess merit or are entirely worthless.

THE PATHOLOGY AND TREATMENT OF PUERPERAL INFECTION.

By EDWARD A. AYERS, M. D.,

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Splendid results have rewarded investigators seeking the origin and character of puerperal infection. That it was not a specific fever; but one subject to the same laws as are the various wound fevers of the body has been proven; its variations from general surgical wounds depend solely upon the anatomical arrangement. The application of general laws of asepsis and antisepsis to the prevention of pueperal infection has been successfully demonstrated. We can not speak so well for the evolution of treatment where a genital wound has become infected. Recognizing the unity of law existing between puerperal and nonpuerperal wounds our logical aim should be to apply the best surgical knowledge in the treatment of "surgical" wounds to the management of puerperal wounds. We are not as near the success that is possible as we should be. This has been due to the hidden character of the uterine wounds and the consequent lack of ability to meet surgical necessities in wound treatment. Thorough removal of débris, thorough antisepsis without poisoning, thorough drainage, stimulation of anæmic tissues when needed, and rest and nonexposure of the wounds are the conditions nature requires in all wounds, but struggles vainly to obtain in many cases of puerperal infection, yielding to the inefficiency of medication, irrigation, and external applications. It can be shown that in certain conditions of puerperal infection intrauterine irrigation will accomplish as little as would the throwing of a stream of antiseptic fluid over the surface of a breast filled with abscesses and the case may still be amenable to local treatment. Between the vulva, vagina, cervix, endometrium and Fallopian tube, each at times an original focus of infection, a wide difference exists both anatomically and pathologically. Puerperal infection, always primarily exogenous in origin, consists in the absorption of living ferments acting directly by destruction of the living tissues or by mechanical obstruction to elimination or indirectly by the absorption of their products, the animal alkaloids. Ernst (Hirst's Obstetrics, Vol. II, p. 401) mentions some forty microörganisms that may be concerned in producing that infection. This list ranges from the comparatively mild varieties to the malignant streptococus erysipelatcus.

We recognize as elements producing a great variation in cases clinically: (1) absorption from a superficial abrasion of the poisonous products of microörganisms simple or malignant in character; (2) the absorption superficially of the living microörganisms themselves; (3) the entrance and retention of the microörganisms or their alkaloids in the tissues beneath the surface by reason of obstruction to drainage or to anæmia and weakness of the tissues; (4) the preference of some microörganisms for certain tissues or the equivalent—special exposure of certain tissues for example; a deep laceration of the cervix, exposing the lymphatics; a postpartum hæmorrhage, filling the uterine sinuses with clotted blood and exposing the veins; edema developed during labor, exposing the connective tissue. These variations make the pathology of puerperal fevers very complex and a consideration of some anatomical conditions present, though adding to the complexity, is necessary. The placental site following parturition is an unprotected "raw" surface. The cavernous layer and basement glandular tissue of the mucous membrane, all that remains, is about two millimeters thick; covered with a thin coagulum of blood, and its meshes, which are abundant, are filled with blood clots. The first step in the regeneration of this membrane is either resorption or throwing off of this blood clot and detritus. In a normal case from seven to fourteen days will see this stage completed. Another week will complete the regeneration of the glandular portion of the mucous membrane. This process is delayed where the vital forces are weakened, as following

a severe post-partum hæmorrhage. Underneath the mucous membrane the muscular wall of the uterus is pierced by the sinuses, which, having no circular muscular fibers, are only closed when the uterine body is contracted. These sinuses may be filled with coagulated blood. The lymphatics which arise in the mucosa and pass through the muscle to communicate with the subserous network are much exposed along the inner surface of the uterus.

The following classification aims to specify the variations that may prevail in genital wounds:

(1) Vulvo-vaginal infection, the wound being a simple abrasion or a laceration of the vulva or perineum or of the vagina, rectum, or bladder or a gangrenous slough, which may occur in any of these structures. The infection may come from without and be either mild or erysipelatous or it may come from within from a labial abscess, rectal fistula, gonorrhœa, or purulent leucorrhœa. I should add—perforations made by sutures introduced, which may create the deep-seated, confined infection.

(2) Cervical infection, anatomical variations; simple abrasions; lacerations due to overdistention or to edema; and gangrene from prolonged pressure or a torn lip.

(3) Intrauterine infection; variations, decomposing blood clot, retained placental tissue, placenta centuriata, retained membranes, gangrenous mucous membrane, decomposing polyps and fibroids, intercellular edema and abscesses, blood clots in the uterine sinuses, phlebetis, lymphangitis, lacerations, and rupture. Sources of infection additional to those mentioned are abscesses in the Fallopian tubes, and cancer.

(4) Pelvic peritonitis; variations, extraperitoneal abscesses around the uterus, abscesses within the peritoneum, the Fallopian tubes, or the ovaries, and hæmorrhages.

(5) General septic peritonitis.

In considering the treatment of these manifold variations brevity necessitates a very partial consideration. The great majority of puerperal infections start in the vulvo-vaginal region. If labor has been accomplished without the introduction of hands or instruments within the cervix prompt local irrigation with corrosive sublimate solution, the cleansing of any abscesses, the cauterization of sluggish ulcers, and the proper use of iodoform will check inflammation and keep it from extending into the uterus, in the majority of cases, unless of the malignant form. Lacerations properly sutured are less likely to cause infection than if left open. Granulation or union are the patient's protection from infection from her own lochial discharge which after the third or fourth day may cause infection if brought in contact with the genitalia of a recently delivered woman. A fissure that is not healing by first intention should be filled with iodoform powder. Deep lacerations of the cervix, in case of infection, are especially prone to cause lymphangitis, that will quickly extend to the boundaries of the peritoneum. Barbour has shown how high the peritoneum rises at "full term," it being above the level of the pelvic brim. The utero-sacral ligaments reach to the first sacral vertebra. Immediate closure of severe cervical lacerations will shut off many of the torn lymphatics.

The differentiation in treatment of puerperal infection located within the uterine cavity is one of the special objects in the writing of this paper.

When we consider that within this cavity there may be blood clots varying from the size of a hazel nut to that of a cocoanut that must decompose if not expelled by after-pains, pieces of placenta, decomposing fibroids, a gangrenous endometrium, underneath which festering mass and within its cavernous meshes thrombi and germs rest in contact, need we wonder that in many cases the exhibition of drugs becomes a farce, and uterine irrigation a delusion and a snare? The rules of surgery call here as elsewhere for thorough removal of débris, drainage, and disinfection. Nature must be given as little to do in elimination as possible, germs must be brought to the surface and not allowed to proliferate in occlusion. I can not consider here the diagnosis of the conditions mentioned further than to suggest that the

character of the labor and the assistance rendered aid much in differentiation. For example, blood clots and thrombi follow great exhaustion, relaxation, and hæmorrhages; sloughs result from prolonged pressure of the fœtal head; lacerations and ruptures follow efforts at internal version, etc. I believe the first step in intra-uterine treatment should be irrigation. Always preceded by thorough cleansing of the vulva and vagina, the uterus should be washed with a solution of corrosive sublimate 1–4000. The fountain syringe should not be held more than 2 feet above the level of the uterus. I prefer my own hard-rubber tube which can be boiled and made to take any curve on cooling for introducing the fluid into the uterus. A quart of freshly boiled water should follow the antiseptic to prevent poisoning. If, following this, the septic symptoms are allayed for only a half hour or hour it is fair to assume that we have not cleansed the wound. If sepsis has already penetrated into the lymphatics, that is, not the ptomaines or animal alkaloids, but proliferating live germs, or if they have penetrated into the veins or intermuscular connective tissue or deep into the uterine sinuses, we may not hope to accomplish much by further intra-uterine treatment; but we are justified in determining the question before we cease efforts. We have as means of treatment gentle compression of the fundus for the expulsion of blood clots or placenta; swabbing of the cavity with cotton; scraping of the internal surface with the curette; further irrigation and the introduction of iodoform gauze. The character of the intra-uterine surface differs in post-partum infection from that which is present following abortions in being softer and much more fragile. The endometrium is less firmly adherent. Therefore it is seldom necessary to use a sharp curette. Moreover, the latter is dangerous as it leaves raw surfaces and so increases the possibility of lymphangitis, phlebitis, and the passage of thrombi into the venous circulation. A large blunt curette passed to the fundus and drawn successively over the placental site, as near as it can be located, will loosen adherent bits of placenta, the coagulum film which covers the surface, the remnants of the uterine serotina, and blood clots that are in the meshes. This débris can be gently removed with the curette, absorbent cotton probangs, and a stream of bichloride solution. The danger of forcing septic material through the tubes and causing peritonitis will be essentially avoided by not allowing the syringe to rest much above the level of the womb, and by keeping the cervix well dilated. I am tempted to say that all this treatment is worse than useless unless followed by the introduction of iodoform gauze up to the fundus. There is some danger of iodoform poisoning; but the danger of death from sepsis from omitting it is very much greater. Iodoform gauze cut in a strip from 2 to 3 inches wide, and from 1½ to 2½ yards long, with no loose fringe, packed well into the fundus down to and through the cervix into the vagina gathers loose débris of blood, pus, membranes, and germs in its meshes; provides uninterrupted drainage; stimulates granulation; and excites uterine contraction. It may be left in situ twenty-four to seventy-two hours according to the symptoms. The medical profession owes much to Polk for introducing gauze drainage in the treatment of uterine diseases.

When, in spite of the means thus far suggested, the septicæmia grows worse instead of better, what resources have we left? First let us consider the conditions we have to meet. The body of the uterus is a mass of muscle filled with pus. Abscesses may be present in the peri-uterine tissues, in the Fallopian tubes, in the ovaries, around the kidneys, or there may develop a diffuse general septic peritonitis. Before the question of abdominal section for septic peritonitis can be decided, and the only answer must be formed from experience, a more thorough classification must be recognized by operators in the different forms of peritonitis. In general diffuse septic peritonitis, an invasion of the lymphatics emanating from the uterus, of the pelvic connective tissue, and, in some cases, of the veins by living virulent microörganisms, has preceded the peritoneal manifestations. Theoretically, to irrigate the peritoneal cavity in such a condition, where the peritoneum is surrounded without with pathogenic material, seems useless; while, on the other hand,

the milder variety of septic peritonitis in which the essential pathologic condition is the presence of pent-up pockets of pus that can be opened and drained, seems to demand an operation. I have been able to collect the reports of 154 cases of cœliotomy for puerperal peritonitis. Of this list 9 are distinctly stated as being cases of general diffuse septic peritonitis; 8 of these cases proved fatal. Of the remaining 145 cases, 108 recovered. Three cases were reported in which no peritonitis was found. It is difficult to differentiate the variety of peritonitis at the bedside, although the virulent form is much more rapid than the mild in its development; but it would seem that an operation should be tried. It will not hasten death much in the malignant variety, may prevent it, and in the benign form is much the most rational procedure. But few cases of abdominal hysterectomy for puerperal infection have been reported; but they are very encouraging. Several recoveries have resulted, and with such prompt improvement in the symptoms, particularly in the case of Kelly (Goldsborough, N. Y. Med. Jour., 1893), and that of Smith (N. Y. Jour. Gyn. and Obs., 1892, II, 1015), that there should be no hesitation about operating.

THE TREATMENT OF POST-PARTAL PELVIC INFLAMMATIONS.

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Some degree of pelvic inflammation is apt to follow every normal labor, every abortion, every missed labor, and, indeed, every puerperal condition which does not run a surgically clean course, without rise of temperature or offensive lochia. According to the course and the severity of the inflammatory condition, life may be imminently endangered or a long history of future pelvic discomfort be initiated by reason of the various forms and degrees of endometritis, salpingitis, and ovaritis, resulting in dysmenorrhœa, uterine displacements, ovarian neuralgia, leucorrhœa, sterility, etc.

A very frequent and important sequence of septic trouble will be an anæmia, which often seems to be pernicious in its severity. Anæmia is both a predisposing cause of septicæmia and a result induced and, at some stage of the illness, sooner or later one of the outstanding lines of treatment will be directed to it. It will be found that those women are more liable to pelvic inflammations who have ill-developed sexual organs, who have practiced tight lacing, who suffer with acute or latent gonorrhœa, who are ill-conditioned and anæmic, who have tubercular disease of the peritoneum or pelvic organs, or who have suffered from intense emotional disturbances as shame, sorrow, or misplaced affections, and such factors as these must be duly recognized for whatever value may attach to them in the early conduct of their puerperia. The severest type of post-partal pelvic inflammation results from suppuration of retained secundines or clots. In these cases during the earlier days of the puerperium, the whole treatment will be directed to clearing out and draining the uterine cavity; but after toxæmia is established we must, in addition to such surgical measures as may be required, rely largely on stimulating the patient's strength by proper nourishment, tonics, and alcohol. Lacerations of the cervix, vagina, perineum, or pudenda or a lowered vitality of the parts from prolonged pressure almost invariably accompany pelvic inflammations following delivery at term and cases in which these conditions exist require most careful observation.

Upon the first appearance of pelvic inflammation it is well to give a saturated solution of sulphate of magnesia in dessert-spoonful doses every two hours till the bowels move freely. Then let the patient rest for a few hours and resume the saline treatment until the bowels again discharge a copious watery serum. This measure will deplete the pelvic and abdominal peritoneum and viscera to a remarkable degree and often be the means of aborting peritonitic or visceral inflammations. The use of saline purgatives in abdominal inflammations has quite superseded the

former routine of giving opiates. In my opinion opiates are nearly always harmful in these cases on account of their paralyzing effect on the muscular fibers of the bowel. We must, above all things, avoid tympanites and the presence of stagnating fæces in the bowel if we wish to prevent peritonitis. Opium favors these conditions. In the first stage of inflammatory trouble, if the peritoneal coverings be involved, I advocate almost complete starvation for twenty-four or thirty-six hours combined with free purgation by the use of salines. I have often been astonished at the rapid subsidence of abdominal and pelvic inflammation which I attributed to absolute quiet, starvation, and the free use of hydragogue purgatives. However, in most cases of post-partal pelvic inflammations we will find by a more or less strict search, a septic condition originating in a denuded surface, either in lacerations of the pudenda, cervix, or at the placental site. Our first care will be to examine these parts most minutely, and to apply, if indicated, prompt means to sterilize and drain the denuded parts. It is of vital importance to recognize the condition and initiate a line of treatment as soon as sepsis occurs. For this purpose there is nothing which answers so well as a spectacular examination through a trivalve speculum. The sense of smell will aid us, as few cases of sepsis occur in which there is no odor. There should never be any odor to the lochia; if there is, watch. Upon evidence of sepsis we must act promptly with some method adequate to check it. The patient should be brought with her buttocks to the edge of the bed and assistants should hold her legs in flexed position. The pudenda and vagina are then to be scrubbed with soap and water and a douche of 1-2000 bichloride of mercury given; then a trivalve speculum is introduced and a search made for the septic area, which will almost invariably be found within the uterine cavity. If the uterine mucosa be in an unhealthy condition it should be swabbed out with pledgets of cotton soaked in peroxide of hydrogen repeatedly at one sitting and, finally, an iodoform gauze drain left in. This procedure should be done daily until all evidence of sepsis is past. In some few cases we will have the question of abdominal section confronting us. If there be pus sacs we must evacuate them, but unfortunately in these cases the uterus is usually infiltrated with pus to such an extent that in order to do a complete operation it would be necessary to do an hysterectomy. In my experience it seems hopeless to attempt the removal of the entire disease in most cases. All that we may be able to do will be to evacuate the pus collections and drain. The kidneys are so often infiltrated with pus in those cases requiring operation as to make one very conservative in advising severe surgical procedures. The urine in these cases should be frequently examined for albumin and vibriones. If there be a bacilluria, the bladder is to be irrigated daily with a weak solution of boracic acid, permanganate of potash or peroxide of hydrogen, and diuretics, preferably distilled water, given freely. In conjunction with the above line of treatment we must give a generous diet and tonics, such as quinine and iron. It is of the utmost importance that the puerperium be prolonged until all evidence of inflammation has entirely subsided.

CONTRIBUCIÓN AL ESTUDIO DE LA SEPTICEMIA PUERPERAL.

Por el Doctor ANTONIO JOSÉ AMADEO,

De la Universidad de Pensilvania, Miembro del Real Colegio de Cirujanos de Inglaterra, etc.

La fiebre puerperal fué conocida de Hipocrates y otros médicos de la antigüedad, siendo objeto particularmente en el siglo actual de numerosos é importantes escritos, cada vez más luminosos con los descubrimientos bacteriológicos de Srs. Pasteur, Widal, y otros autores eminentes, confirmándose por último el origen parasitario de la septicemia puerperal.

Entre los micro-organismos encontrados en la cavidad uterina infestada, atribúyese al estreptococo piogeno la producción de tan terrible morbo, siendo rara la

multiplicación de otro microbio procedente de un traumatismo ó de una afección crónica de los órganos genito-urinarios.

Las condiciones en que se encuentra el aparato genital de la mujer durante el puerperio, son en extremo favorables para la penetración de agentes infecciosos.

El parto natural determina, sobre todo en las primiparas, rasguños, escoriaciones á lo que hay que añadir el sitio placentario abierto á la absorción; pero es mucho mayor el peligro después de las intervenciones quirrúgicas, causantes algunas veces de contusiones y pequeñas heridas del conducto vulvo vaginal y uterino.

Grietas en las mamas, soluciones de continuidad en otra parte, la via pulmonar y hasta el tubo digestivo, se creen puertas de entrada del microbio en cadeneta.

ETIOLOGÍA.

Todos los autores hablan de las modificaciones sanguineas de la puerpera como causa predisponente de la intoxicación, y lo que no debe dudarse, si bien según nuestras observaciones (en veinte años de práctica de obstetricia en esta Isla) dispone más que nada á la afección la diatesis escrofulosa.

Entre la composición química de los humores, el sistema linfático y las células, fórmase un conjunto favorable para la vida de los destructores parásitos; y hay mujeres que en los últimos días del embarazo parece llevan ya en su indefenso organismo, los gérmenes sépticos desarrollándose con fuerza.

Con historia de linfangitis, infartos ganglionares, leucorrea y otros atributos de la escrofulosis, debemos prevenir á las familias, máxime cuando se trata de practicar operaciones tocológicas, perfectamente toleradas por las mujeres de buena constitución, mientras que en las linfáticas es muy común la septicemia, á la que también coopera la metritis crónica, la gonorrea, y el tinte sifilítico.

Las operadas deben permanecer en cama hasta la completa involución del útero, pues hemos visto, por levantarse pronto, sobrevenir inflamaciones agudas de dicha entraña, seguidas de infección séptica.

Emociones violentas pueden ser causa del mal, y la fiebre tifoidea y la puerperal han sido huespedas de la misma casa, por lo que aconsejamos á las paridas huir del bacilo de Eberth.

Después de los abortos es rara la dolencia, siendo más frecuente en la primavera que en las demás estaciones del año.

ERRORES DE DOCTRINA.

Con la creencia de que las enfermedades de esta zona eran todas debidas al paludismo, la calentura puerperal fué considerada y tratada como tal, hasta que la ineficacia de la quinina ó el daño producido por altas dosis del medicamento, demostraban la equivocación y sus consecuencias por el tiempo perdido en administrar los agentes antisépticos locales.

El dominio etiológico concedido á la malaria ha sido una remora constante para el mejor estudio de los procesos patológicos de este clima.

Aquí, como en los Estados Unidos y Europa, la septicemia puerperal se observa en todas sus formas.

DIAGNÓSTICO DIFERENCIAL.

Sería también un error atribuir á la infección séptica todo movimiento febril. Cuando una embarazada ha tenido calenturas intermitentes pocos días antes de dar á luz, suelen estas presentarse al primero ó segundo día del puerperio y desaparecen con una dosis de sulfato de quinina.

En los partos difíciles la perturbación nerviosa y el desgaste de los tegidos, determinan una fiebre con auto-infección ligera, igual á la que se presenta en las mujeres habitualmente constipadas.

La secreción lactea y repleción de las mamas, ocasiona simple pirexia que cesa pronto con los remedios apropiados, y de la calentura tifoidea se distingue la septicemia puerperal por los escalofríos repetidos, la fetidez de los loquios, las localizaciones uterinas y en último caso por el criterio bacteriológico.

FORMAS DE LA ENFERMEDAD.

INTENSA.

En las mujeres linfáticas, anémicas, principia del primero al segundo día del parto con fuerte escalofrío, al que sigue alta temperatura 41.42° centígrado, pulso muy frecuente, supresión de loquios y síntomas ataxo-adinámicos mortales.

En estos rápidos casos parece que las sustancias sépticas ó microbios penetran en la sangre por medio de la venas y los linfáticos, con sus efectos desastrosos y poco ó ningún daño visceral.

GRAVE.

Se presenta en los primeros ocho ó quince días del puerperio. Escalofrío, temperatura 39.40° centígrado, exacerbaciones vespertinas, intranquilidad, insomnio, loquios muy fétidos, ardor en la orinna, localizaciones en el útero y ovarios, que se extienden al peritoneo y tejido celular, dando lugar al peritonitis, más ó menos extensas y á supuraciones en la región inguinal. Si existen soluciones de continuidad toman el caracter gangrenoso ó diftérico.

La pirexia sigue su marcha continua con síntomas adinámico-tíficos y graves lesiones viscerales, terminándose del tercero al cuarto septenario por la muerte ó por la convalecencia, siempre larga, penosa, sobre todo si hubo flegmasia alba dolens, una de las manifestaciones lentas y comunes del grave proceso infeccioso que mientras más se prolonga mayores son las probabilidades de salvar la pacienta.

Las mismas ulceraciones diftéricas de la vulva y vagina en el estado puerperal, las hemos visto en los vegigatorios de las personas linfáticas.

MENOS GRAVE,

En mujeres de buena constitución por laceraciones vagino-uterinas ó por retención de la placenta se presenta calentura que dura algunos días con escalofríos repetidos, fetidez de los loquios y otros fenómenos de infección, terminándose con frecuencia por una diarrea ó diaforesis abundante. La extracción de las materias putrefactas del útero, pone pronto término al estado febril.

Ciertos organismos tienen una extraordinaria fuerza de resistencia contra las sustancias sépticas ó como se dice en el lenguage médico moderno, propiedades bactericidas; y sabemos de campecinas pobres con placentas adheridas (sin ninguna asistencia médica) que en medio de una fiebre de infección grave, eliminaron poco á poco todos los productos de descomposición, curándose, puede decirse, por los solos esfuerzos de la naturaleza.

PROFILAXIS.

Es por demás censurable la costumbre de admitir visitas frecuentes en la alcoba de las recien paridas, que necesitan un aire puro y libre de principios nocivos.

La existencia de casos de erisipela, dotienenteria, difteria ú otra afección microbiana debe redoblar los cuidados, y muchas madres han perecido por ignorancia ó negligencia de estos consejos.

Buenas condiciones higiénicas y medios antisépticos se imponen después de cualquiera operación, cuidando el médico que sus utensilios y los de la enfermera, así como los vestidos, se hallen limpios y desinfectados.

Los loquios deben vigilarse y son el primer aviso de gravedad.

TRATAMIENTO.

(1) Antisepsia rigurosa de los órganos genitales.

(2) Rebajar la hipertermia.

(3) Combatir la peritonitis.

(4) Favorecer la hipercrinia intestinal para eliminar del organismo productos venenosos, siendo una diarrea espontánea el medio que á veces emplea la naturaleza para librarse de la muerte.

(5) Emplear los antisépticos internos, combatiendo la adinamia y el estado tífico con la quinina, los tónicos, antiespasmódicos y alimentos apropiados á las fuerzas digestivas de la enferma.

(6) Dilatar los abcesos formados, empleando el método antiséptico.

DISCUSSION.

Dr. De Saussure, of South Carolina, wants to record himself as being opposed to opening the abdomen in cases of general puerperal peritonitis when the uterus alone is infected; curretting with antiseptic precautions and packing is always in order, and possibly ablation of the organ will prove in time to be a proper procedure.

Dr. Robert A. Murray, of New York. The papers read are admirable in the thoroughness of their descriptions, pathology, indications for treatment, and not so full in regard to the prophylaxis. Puerperal fever of all varieties is preventable and practically, since after the poisoning of the patient medicine is almost powerless, the best treatment is prevention by aseptic, and, if necessary, antiseptic midwifery. The mortality in childbed from sepsis should be nil and the accoucheur who has puerperal fever in his practice must look to himself primarily for the cause, next to his nurse and her care of the patient, and, painful though it be to him, must blame himself for the dire effect of the accouchement, the sickness or death of his patient. That this statement is not too strong, I may state that in a practice of nearly twenty years I have yet to see my first case of puerperal fever in a patient confined by myself. In the New York Maternity, on Blackwell's Island, in three years, there about 950 births. A great many of these were difficult labors and forceps, low and high, were used in 130 cases, version performed about 28 times, craniotomy 9 times, Cæsarian section once, and sympyseotomy twice, yet not one case of sepsis. This work was done under four visiting surgeons and with internes who were changed about every three months so that it was certainly the methods practiced quite as much as the men. The method was the antiseptic method of midwifery thoroughly carried out with as much care as the abdominal surgeon devotes to the aseptic operation and treatment of his abdominal cases. Dr. Garrigues has written fully of this method as also have the other surgeons connected with the hospital. To outline it briefly: The patient before labor is bathed; the skin, kidneys, and bowels are attended to so that all the emunctories are working well. The vulva and vagina are cleansed thoroughly with a bichloride injection of 1-5000 and an antiseptic pad placed over the vulva so as to completely prevent infection from without. Examinations to determine the progress of the case are as few as possible, yet no endeavor is made to avoid them altogether, as the case is kept carefully under observation. The nurse or surgeon who examines digitally washes the hands thoroughly with green soap and nail brush in hot water, then in bichloride solution 1–5000; then, without touching clothing, wets the fingers and hands with a 2 per-cent creolin solution; the vulva pad is removed by the other hand and the finger introduced into the vagina and, if necessary, into the uterus, the examination made and the pad is restored to the vulva.

On the delivery of the child the vulva is covered with the antiseptic pad and some of the solution is poured over the vulva to thoroughly disinfect any lacerations which have been made. The placenta is delivered by Crede's method, the pad again placed over the vulva and during the whole time of the puerperium the entrance of germs is effectively prevented by the antiseptic pad. If operations or manipulations require the hand to be introduced into the uterus or if there be a putrescent child or if there be post-partum hæmorrhage, the hot antiseptic intrauterine douche is given, the finger guiding the glass intrauterine tube and holding the cervix uteri patulous so that drainage of the clots, placental débris, and water may be permitted.

If, as in the case of putrescent children or where parts of placental tissue are left in the uterus, the asepsis not having been perfect, fetor appears on the napkin or

pad, the vagina should be douched antiseptically and the aseptic finger passed into the uterus and thorough exploration of the entire surface of the uterus be made. This is possible as the cervix is patulous and the uterus with the hand externally can be easily crowded down in the pelvis. Particularly should the coruna be examined, as about the entrances of the Fallopian tubes is the site where shreds of placental tissue are left which, putrefying, cause extension of sepsis to the tubes. On the withdrawal of the finger from the uterus the odor will indicate if there is any necrotic matter present. If this be found the blunt curette should be used after an injection and with Simpson's placental forceps the débris should be removed and a thorough antiseptic injection of uterus and vagina given, the uterus being held firmly contracted; the pad is replaced and usually there is no other interference necessary, the case proceeding aseptically to convalescence. The cervix uteri, I have stated, is patulous when sepsis is present. This is absolutely true in early sepsis, but if it comes late or after mismanaged abortions or miscarriage cases, the cervix may not be patulous enough to investigate the endometrium with the finger, though I have never seen a case where a small blunt curette could not be introduced and the diagnosis be made and curettage be done. In the majority of cases puerperal fever is not of the lymphatic variety, but the poison is absorbed either through lacerations of the vulva, vagina, or from the endometrium by the veins, and the endometritis, which is almost always present, extends by continuity of tissue through the Fallopian tubes to the peritoneum, giving rise to a general or local septic peritonitis. The indication is clear, then, to prevent absorption of any more poison, hence the *rationale* for the local treatment by disinfecting and repair of such lacerations as have occurred and the use of the curette and hot antiseptic douche to cleanse the uterine cavity. The intrauterine douche also causes the uterus to contract and so closes the mouths of the uterine veins. One of the most marked peculiarities of the uterus in puerperal fever is the loss of tonicity and contractility. One of the powerful factors in prevention of puerperal fever is the shortening of the time of labor. The patient, exhausted by a prolonged labor, necessarily has a uterus which does not readily contract, the liability to septic absorption is greatly increased. It is noticeable in hospital service that the frequency of fever bears a very close ratio to the duration of labor; hence every effort is made to save the patient's strength and forceps are employed as soon as the natural powers are ineffective, which explains the frequency of the forceps cases in the statistics before stated.

The treatment of the disease as detailed by the authors of the papers is, I believe, effective and fulfills every indication. In regard to laparotomy and drainage of the abdominal cavity for septic peritonitis I can say that where the peritonitis is general, no case that I have seen has recovered and where the disease is local success has been frequently the result; the pus tubes and ovaries being removed and the cavity drained with iodoform gauze.

Dr. Giles S. Mitchell said he desired to thank Dr. Ayres for his able and eminently practical paper. He indorsed it most heartly. However, he could not agree with a statement made by Dr. Murray (who had so learnedly discussed the paper), i. e., never curette the uterus for portions of retained placenta or membranes unless you first locate their point of attachment by the introduction of the finger. Now, every one who has had experience in a large number of cases knows how difficult, nay, even impossible, in some cases it is to introduce the finger high up in the uterus. Cases coming under observation a week or ten days after delivery or abortion, where the organ is fixed and tender due to pelvic cellulitis and peritonitis; in such cases, according to Dr. Murray's statement, the source of infection should be allowed to remain and kill the patient, unless it is possible to locate it with the finger. It is neither difficult nor dangerous to curette the uterine cavity, especially if the dull curette is employed. I never hesitate in any case where it is difficult to introduce the finger to depend solely upon the curette.

Remarks by Dr. Edward A. Ayres on the Paper, the Pathology and Treatment of Puerperal Infection.

In answer to the inquiry of the president as to whether I have found it practicable to introduce the finger high enough within the uterine cavity to feel the entire surface, as has been mentioned by Dr. Murray, I can only say that under reasonable conditions it has not been possible. Under anæsthesia, and with full dilatation of the cervix, it might be accomplished; but I would fear to apply such dilatation where infection was present. I must reiterate the emphasis imposed in my paper regarding the value, I may say the necessity, of using iodoform gauze in these cases of infection which require intrauterine cleansing. I am convinced that its value is clearly established by clinical tests of the most demonstrable character. Polk has shown, and many others since, that many cases did not do well until the treatment included gauze drainage. The cervical region and the portion in the neighborhood of Bandl's ring may prove of sufficient obstruction to drainage, without the gauze, to cause further absorption of poison with its consequent symptoms, not to mention its well-known surgical values in developing a healthy wound. What has been said regarding the prevention of infection is quite true, and probably can not be said too often. In my clinic at the New York Polyclinic not a case of infection has occurred in the last seven years, involving over 2,000 cases of labor, other than those already infected when first seen. But it is the belief of the speaker that the prophylaxis is now pretty well understood and practiced whereas differentiation of treatment in infection is much less thoroughly considered or applied. And while marvelous success has been attained in the prevention of infection, we know from a study of the etiology, that it can never be entirely avoided.

NOTE ON THE INDUCTION OF LABOR AND ACCOUCHEMENT FORCÉ IN THE PREVENTIVE TREATMENT OF ECLAMPSIA.

By CHARLES JEWETT, A. M., M. D.

Whatever room there may be for difference of opinion with reference to other questions in the etiology of childbed eclampsia, it is impossible to lose sight of the fact that the ultimate cause of the trouble is the presence of the child in utero. So long as the cause remains our resources, either for the treatment or prevention of puerperal convulsions, are at the most an uncertain reliance and often prove wholly futile. A pregnancy nephritis once established, the kidneys never regain their normal condition while the pregnancy continues. Dietetic, diaphoretic, and cathartic measures are at best but temporary expedients. They do not cure and the patient is never out of danger till the uterus is empty. The extra tax upon the crippled kidneys increases rapidly in the later weeks of gestation and the danger grows with the growth of the child. The woman is never wholly free from the possibility of a sudden explosion of uræmic symptoms. On the occurrence of convulsions the gravity of the condition is enormously increased and with each succeeding attack it becomes less and less amenable to treatment. Chloral, chloroform, and veratrum viride have reduced the mortality, but many lives are still sacrificed by eclampsia. Despite the most skillful treatment of the albuminuria of pregnancy convulsions occur in a large proportion of cases. The general mortality of eclampsia is not less than one in four and even the lowest attainable death rate is still a formidable one. After labor, on the other hand, the nephritic symptoms subside and prompt recovery is the rule. The convulsions seldom begin in the post-partum period and they always yield more readily to remedial measures in the puerperal than in the pregnant or parturient woman.

These considerations, I believe, are sufficient to justify a more active policy in the preventive treatment of eclampsia than is commonly pursued. While most authorities agree that labor should be brought on upon the occurrence of eclampsia, few

sanction the interruption of the pregnancy as a preventive measure. Obstetricians who carry their patients through the last weeks of gestation in a condition bordering upon convulsions find ample justification in the teachings of the text-books. Objection is usually urged against obstetric interference that labor may prove a formidable complication of an already dangerous condition. It frequently results that the obstetrician is finally compelled to terminate the pregnancy under still more unfavorable conditions or, what is worse, labor begins spontaneously and repeated convulsions have occurred before medical aid can be had. A much larger number of lives, I believe, would be saved by the induction of labor before the dangerous period is reached. In severe nephritis of pregnancy no other course promises so much for the safety of the mother as the evacuation of the uterus. Before the fœtus is viable the obstetrician is warranted in taking a certain amount of risk to the mother in the interests of the child. It is especially in the last month of gestation that I would plead for a more energetic prophylaxis by the induction of labor. At this time the child has at best little to gain and both patients frequently much to lose by longer continuance of the pregnancy. The interests of mother and child are best served by bringing on the labor at a time when the woman's condition is still such as to offer a fair prospect of escaping the eclamptic attacks, early enough, if possible, to surely anticipate the critical period.

Under the methods formerly employed the induction of labor was a difficult and tedious undertaking. Even in timely interference the advantages of prompt delivery were only partially realized. With the intra uterine injection of glycerin, recently introduced by Pelzer, uterine contractions may be set up at will and the birth as a rule terminated with rapidity and safety. In most cases labor begins immediately and is actively established within two hours. Not only does the glycerin injection act to inaugurate the pains, but in a greater or less degree to maintain them. Its influence upon the uterine contractions apparently persists in many cases to the completion of the third stage. To act at best advantage the glycerin must be carried high up toward the fundus, must be widely diffused between the membranes and the uterine wall by gradual injection, and its too rapid escape prevented by keeping the patient in the latero-prone position. Usually in timely operations no other obstetric measures will be required to expedite the birth. When the induction of labor has been too long delayed and eclamptic attacks are imminent, a still more active interference is demanded. After the first stage is well advanced under the use of the glycerin injection, resort should be had to manual dilatation of the cervix under chloroform and the prompt termination of the labor with forceps or version. Active dilatation by the use of the hand, however, should not as a rule be undertaken till the body of the cervix is merged into the lower uterine segment and its lower border well thinned. Rudely practiced, accouchement forcé is a dangerous operation. With a rigid asepsis and reasonable precautions against the use of undue force, it may be made a safe and conservative procedure. Even in the event of accidental lacerations the injury in a properly conducted manipulation will not extend beyond the cervix and is of small moment in comparison with the advantages of speedy delivery. All such injuries, however, are preventable by due care in operating. The operator's hands and the field of operation should be prepared with the same thoroughness that is observed in abdominal surgery. The amount of force used must be scrupulously guarded. In simple cases the dilatation is accomplished with surprising facility and the patient sometimes spared hours of labor and continued danger. In rigidity of the cervix, while a much longer time will be required, much may still be gained. From ten minutes to two hours will usually suffice to complete the dilatation and terminate the birth. The total length of labor will seldom exceed twelve hours; in emergency may generally be reduced to five or six.

The plan which I advocate is illustrated in the following cases:

Case 1.—First pregnancy ended in stillbirth at seventh month, the second in abortion at two months. Syphilis was suspected and the patient placed under mercurial treatment. In the third pregnancy a moderate albuminuria developed

early in the ninth month. The albumin diminished under the usual treatment, including a partial milk diet, but subsequently began to increase again. In view of the albuminuria and the previous history, the parents were justly solicitous for the safety of the child. Though the patient was supposed to be within a few days of confinement, it was resolved to bring on the labor. At 11 A. M. 3 ounces of glycerin were injected into the uterus under full antiseptic precautions. At 3 P. M of the same day the os internum was effaced, the cervix well softened, and the external os dilated to the size of a dollar. Under chloroform the dilatation was cautiously completed with the hand and in six hours from the time of the intra uterine injection the child was extracted with the forceps. It was resuscitated with difficulty, but is now living and thriving at the age of three months. The mother suffered no injury except two episiotomy cuts which were sutured. Her recovery was feverless and uneventful. The placenta presented a number of large white infarcts and an area of degenerated structure, the nature of which was not determined. The child probably would not have survived many days longer in utero.

Case 2.—Primipara, in the beginning of the ninth month. Albuminuria for three weeks. The proportion of albumin was not large, but had commenced to increase in spite of a milk diet and the usual medical treatment. Although there were no marked uræmic symptoms the conditions justified the belief that they could not be long deferred and it was resolved to anticipate more serious trouble by inducing labor. The glycerin injection was made at 12 M. At 4:30 P. M. the cervix was half dilated and dilatable. Dilatation was completed with the hand, under chloroform, and the birth terminated without instruments within a half hour. The child soon after birth had a violent convulsion (presumably uræmic) and subsequently an attack of purpura, but survived and is now in good health and vigor. The mother sustained no injuries and her recovery was uncomplicated.

Case 3.—Primipara, at the end of eighth month. When seen by me she had grave albuminuria, which had not yielded to the usual medical measures. The urine coagulated in mass on heating. Intrauterine injection of glycerin (℥ iii to iv) at 2 P. M. Labor began promptly. At 7 P. M. was summoned again owing to a convulsion. The patient was a woman of a highly neurotic type and the condition one of more than usual gravity. The physicians in attendance were agreed that extreme measures were justified. Under chloroform one finger after another was passed into the cervix and finally the entire hand. The process of dilatation did not occupy more than an hour. The child was extracted with axis traction forceps. The cervix was subsequently found to have been deeply lacerated, but for ten days after delivery the temperature did not rise above the normal. Under the moderate use of chloral there were no further convulsions. At about the tenth day a pyelitis developed, but from causes for which the method of delivery was not directly responsible. The necessity for using the catheter, which had persisted for several days after labor, explained the source of infection. From the latter complication the patient slowly recovered. The child was resuscitated after a half hour's presistent effort and is now after several months still living and thriving. While the cervical injury in this case was nothing more than often happens in difficult deliveries, it was an unnecessary accident. With a still more gradual dilatation it would have been prevented.

In six other intractable cases of pregnancy-nephritis under my observation a similar plan was practiced. All the mothers recovered and none of the children were lost which had reached the viable period.

In conclusion, the propositions which I wish to submit for discussion are:

(1) In the nephritic complications of pregnancy after the full period of fœtal viability has been reached and the albuminuria is not controlled by medical measures, the pregnancy should be terminated without waiting for pronounced uræmic symptoms.

(2) With eclampsia present or impending, accouchement forcé, under the restrictions mentioned, is a justifiable procedure.

Dr. Garrigues, being called upon by the president, Dr. Mitchell, made the following remarks:

REMARKS ON PAPERS ON DYSTOCIA.

Ad. II. Version by external manipulation.—I have found it valuable and easy. Can only be used when the bag of waters is unbroken. When the head or breach is brought down a towel rolled so as to form a hard cylinder should be placed on either side of the abdomen and held in place by a tight binder.

Ad. III.—I use Simpson's modification of Tarnier's forceps and have found it applicable when the latter could not be introduced on account of its bulk and its roughened inner surface. Axis traction forceps make delivery easy. With them a tyro can do what only an experienced obstetrician can do with a common forceps and an axis traction forceps is a labor-saving machine. In cases in which I used to have backache for a week I do not feel any fatigue with the new instrument.

Ad. V, VI, VII. Use and abuse of forceps; more frequent use in multiparæ.—Forceps ought not to be used if head is not engaged; turning and extraction is preferable. Forceps ought not to be used if there is great disproportion between child and pelvis, normal child and conjugate below 3¼ inches (8.5 cm.). Symphyseotomy should be employed down to a conjugate of 2¾ inches (7 cm.) and below that Cæsarean section. If the pelvis is generally contracted, the lowest limit for the use of forceps is even 3¾ (9.5 cm.). In low forceps operations no rule can be laid down as to how long one shall wait before delivering by forceps. The golden rule is to let nature do the work if she can; but as soon as there is impaction we ought to deliver. A short great pressure is borne better than a protracted smaller pressure. The impacted head is apt to cause gangrene and vesico-vaginal fistula. This has become a much rarer affection since the forceps is being used more frequently.

Ad. VIII. The modern Cæsarean section.—The name would be excellent if it had not been used before in another sense. P. Müller, of Berne, Switzerland, wrote in 1882 an important monograph with the title "Der Moderne Kaiserschnitt," by which he designates Porro's operation, and before him, in 1881, Schlemmer, practicing near Aix-la-Chapelle, in Germany, had published a paper called "Die Porro-operation oder die *neue* Kaiserschnitt-methode," which almost amounts to the same. I think the name I have given to the conservative operation, namely, the improved Cæsaren Section, in American Journal of Obstetrics, in 1883, is the best. But any name is better than to dub the operation with the name of a man who had only one new idea about it and that one which has been given up as worthless. In my article in the October issue of the American Journal of Obstetrics, 1886, I showed in detail that every feature of the improved Cæsarean section belonged to somebody else and in October, 1882, I performed a Cæsarean section, which in the list of so-called Sänger operations ranks as the third while Sänger himself only comes in as No. 8. At that time I had not read a line written by Sänger and did not know that he existed. I applied only the common rules of modern surgery and thus I performed the improved operation as it has been performed during the time elapsed since then. Cæsarean section should only be performed if the narrowness is too great to allow us to perform symphyseotomy. It can not compete with the latter on account of the much greater maternal mortality.

Ad. X and XI. Surgery and obstetrics.—Surgery has given us two nearly perfect operations in the improved Cæsarean section and symphyseotomy; but more important than any operations, which only are called for in exceptional cases, is antiseptic midwifery, which is an offspring of antiseptic surgery, although it was invented long before. Antiseptic surgery began in 1866. The first attempts at the adoption of antiseptic principles in midwifery were made by Stadfeldt, of Copenhagen, Denmark, in 1870. But as early as 1847, Semmelweis had understood the septic nature of puerperal fever and recommended the use of antiseptic prophylaxis. The same applies to the strict modern antiseptic midwifery, beginning with the introduction of bichloride of mercury. The obstetrician, Tarnier, laid it before the International Medical Congress in London, in 1881, but it did not make any impression until Schede worked wonders with it in general surgery in 1883. By preventive antiseptic midwifery thousands are saved for one who is saved by the antiseptic operations.

Dr. Florence Donohue, of Washington, D. C., in discussing the subject of the administration of ergot, either in a normal or complicated case of labor, said that in no instance should it be given, if at all, until after the completion of the third stage, or delivery of the placenta. The action of the drug contracts the uterus at the cervix as well as at the body or fundus and when given at the first stage, as it

is often done by midwives and uninformed practitioners, the action is not expulsive, but is tonic, spasmodic, and contractile and while hermetically sealing the uterus, it crushes and destroys its contents and the result is, as is well known, a still-born child. If given before the completion of the second stage, there is danger of too rapid expulsion before the parts are thoroughly prepared and rupture of the perineum may be feared. The same objections to giving ergot before the termination of the first stage obtains in the third stage as it is not known how or where the contraction may take place. The "hour-glass" contraction whereby the placenta may be shut up and held in the fundus and its expulsion greatly retarded is well known to you all. A full dose of fluid extract of ergot may be given with safety and with benefit after the expulsion or removal of the placenta, and not until then.

Dr. W. Reynolds Wilson, of Philadelphia. I desire to make a few remarks in support of Dr. Price's paper. I am connected with a maternity hospital which presents a record favorable to that of most such hospitals and which should be made known to the profession. In the Philadelphia Lying-in Charity we deliver some 300 women during the year, we instruct nurses and teach students in practical work, and we conduct a daily obstetric and gynecologic clinic and yet we present results which illustrate the care with which this work is conducted. The reason for success in this work is the maintenance of absolute discipline in every branch of the work, an advantage which can not be so readily obtained in private work.

SECTION VIII.—GYNECOLOGY AND ABDOMINAL SURGERY.

Honorary Presidents.

Dr. Rafael Benavides, Lima, Peru.
Dr. Young H. Bond, St. Louis.
Dr. Domingo F. Cubas, Havana, Cuba.
Dr. Clinton Cushing, San Francisco.
Dr. Wm. E. B. Davis, Birmingham, Ala.
Dr. Christian Fenger, Chicago, Ill.
Dr. Frank P. Foster, New York.
Dr. Thos. H. Hawkins, Denver.
Dr. Wm. D. Haggard, Nashville.
Dr. Edward W. Jenks, Detroit.
Dr. Joseph Taber Johnson, Washington.
Dr. Ernst S. Lewis, New Orleans.
Dr. Andres Lopez Martinez, Tegucigalpa, Honduras.
Dr. Richard B. Maury, Memphis.
Dr. Thomas E. McArdle, Washington.
Dr. Lewis S. McMurtry, Louisville.
Dr. Roberto Moericke, Santiago, Chile.
Dr. Robt. T. Morris, New York City.
Dr. Paul F. Mundé, New York.
Dr. Joseph Price, Philadelphia.
Dr. Charles A. L. Reed, Cincinnati.
Dr. John C. Reeve, Dayton, Ohio.
Dr. José Manuel de los Rios, Caracas, Venezuela.
Dr. George H. Rohé, Catonsville, Md.
Dr. James F. W. Ross, Toronto, Canada.
Dr. Albert Vander Veer, Albany.
Dr. Milo B. Ward, Topeka.
Dr. Henry P. C. Wilson, Baltimore.
Dr. Nicolás San Juan, City of Mexico, Mexico.
Dr. F. Henrotin, Chicago, Ill.

Executive President.

Dr. Wm. Warren Potter, 284 Franklin Street, Buffalo, N. Y.

Secretaries.

Dr. Brooks H. Wells (English speaking), 71 W. 45th street, New York, N. Y.
Dr. Ernest W. Cushing (Spanish-speaking), 168 Newbury street, Boston, Mass.
Dr. Maglioni L. C. Llobet (Victoria 737), Buenos Ayres, Argentine Republic.
Dr. Manuel Cuellar (hijo), Sucre, Bolivia.
Dr. Luiz da Cunha Feijo, Rio de Janeiro, United States of Brazil.
Dr. Gabriel Casuso (Virtudes 37), Havana, Cuba.
Dr. C. E. Gooding, Bridgetown, Barbados, West Indies.
Dr. José M. Buendia (Calle 10, núm. 212), Bogota, Republic of Colombia.
Dr. Moises L. Castro, Cartago, Costa Rica.
Dr. Mariano Fernandez Padilla, Guatemala City, Guatemala.
Dr. Ribaul, Port au Prince, Haiti.
Dr. G. P. Andrews, Honolulu, Hawaii.
Dr. José Maria Ochoa Velásquez, Comayagua, Honduras.
Dr. Saunders, Kingston, Jamaica, West Indies.
Dr. Ricardo Fuertes (calle Don Juan Manuel, núm. 4), City of Mexico, Mexico.
Dr. M. J. Barrios, Rivas, Nicaragua.
Dr. Enrique Pouéy (Uruguay 371), Montevideo, Uruguay.
Dr. Ezequiel Jelambi, Caracas, Venezuela.

PROCEEDINGS.

The section met September 5, 1893, Dr. L. S. McMurtry, of Louisville, Ky., in the chair.

Dr. McMurtry addressed the section in these words:

GENTLEMEN: I have been called upon by the executive committee to discharge the duties of presiding officer in the place of the president, Dr. W. W. Potter, of Buffalo, N. Y., who, on account of ill health, is unable to be present. Owing to the brief notice given me of the duties and honor which were to be conferred on me in being designated to preside over this section, I must ask your forbearance and indulgence for not having prepared a more formal address of welcome. I can only say that it gives the profession of this country very great pleasure to welcome to our councils the members of our profession from our sister republics. I trust that those who have assembled in this hall with us will give us the benefit of their knowledge and experience in the discussion of the papers which will be presented. I take great personal pleasure in welcoming all the fellows present to the work of the section and I ask their coöperation in the business which will come up before us. I trust that my colleagues in the vice-presidency will share the responsibilities of presiding officer with me and will give me their assistance in the duties of the office. I trust that the gentlemen will take part freely in the discussions of the section without waiting for a formal invitation, for the value of the discussions are entirely lost unless the members actively take part in them. Without any further remarks we will enter at once upon the programme laid down for the section.

PAPERS READ BEFORE THE SECTION.

THE INTRAUTERINE TAMPON.

By ANDREW F. CURRIER, M. D., of New York.

If we recall the developments of the past fifteen years, we can not avoid the conviction that gynecology, both as a science and an art, has progressed at a wondrous pace. In the pre-antiseptic days the surgeon who made a practice of entering any of the organs or closed cavities of the body was considered bold to the verge of rashness. The same judgment was applied to those who habitually invaded the uterus with hands or instruments for purposes of exploration, medication, or surgical procedure, whether the organ was impregnated or unimpregnated. With the knowledge which is now at our command we can almost unhesitatingly enter almost any organ or cavity of the body, it being presupposed that the entrance will always be effected in a decent and cleanly manner and without an undue exhibition of violence. Of all the organs with which antiseptic surgery has made us practically familiar none is more tolerant and long-suffering than the uterus and yet it occasionally happens that a sharp reproof is required as an admonition that we must not presume too much upon this tolerance.

Notwithstanding all the work that has been done by those who have investigated the physiologic and pathologic conditions pertaining to the uterine mucous membrane we are just beginning to appreciate their significance. The work of Récamier, Sims, and the few of their followers who were bold enough to imitate them in the use of the sharp uterine curette was for years looked at askance by multitudes of the profession in the same way that they devoutly uttered the formula "meddlesome midwifery is bad" whenever they came to complications which, from timidity or ignorance, they would not face. There is always an excuse for ignorance, provided it does not prevent others from doing the right thing and so it may be that we should speak kindly of all those who could not follow Récamier and Sims in what seemed in their day unreasonably bold procedure. With the era of antisepsis and greater cleanliness and the increased knowledge of the histology and pathology of the endometrium it has come about that if bad results attend the use of the curette the fault belongs principally to the gynecologist for selecting a bad moment to operate or for failure to properly prepare himself or his instruments. With the advances in gynecologic and obstetric knowledge have come the various devices for dilating the uterus, whether unimpregnated or parturient; the rubber bags dilatable with air or water, the wooden, metallic, rubber, and glass dilators and stems and the recognition that the most excellent results are possible from the use of such agencies. The value of tents of various materials as dilating agents is not denied, but decided objections could be offered to any and all of them. An important fact, which has only recently been generally appreciated, is that there is no more wisdom in retaining vicious secretions within the uterus than in any other portion of the body and that the surgical principle of drainage, which is applicable and valuable for other portions and cavities of the body, is equally valuable for the uterus. This is the basis upon which the present extensive and I think rational practice of intrauterine treatment rests; dilatation, curetting, and drainage are the three foundation stones. From the propriety of dilating the uterus to that of packing it with a tampon is a short and logical step. The usefulness of the vaginal tampon has long been recognized as well as its inefficiency in many cases for the reason that it does not directly reach the source of the trouble. I have frequently seen cases in which all tonicity of the vaginal muscle was lost on account of the frequent and extensive packings to which it had been subjected for the relief of hæmorrhage from the uterus. Fritsch and Vulliet were the first, so far as I know, to demonstrate that the capacity of the unimpregnated uterus could be greatly increased by the gradual introduction, day after day, of plugs of antiseptic cotton and that such a procedure would enable one to treat certain diseased conditions of the organ with a facility and success which had previously been unknown. The tampon, therefore, has practically opened a new field in intrauterine therapeutics.

MATERIALS FOR THE TAMPON.

The conditions which must be satisfied by tampon material in order that it may accomplish the desired effect are that it should be easily managed, that is, easily introduced and removed, antiseptic, soft, distensible, and with good draining properties. Substances which are available are absorbent cotton, carded wool, antiseptic gauze, antiseptic jute, charpie, wood wool, etc., all of which have been used for drainage purposes in other parts of the body. It will not be necessary to discuss at the present time the advantages and disadvantages of all these materials. My preference is for antiseptic gauze, carded wool, or absorbent cotton in the order mentioned. I have not yet used the carded wool for this purpose, but it seems to me to present peculiar advantages in its lightness, softness, cleanliness, and compressibility. Absorbent cotton, which is recommended by Vulliet, is easily managed, absorbs fluids with great avidity, and drains readily; but it is converted into a hard mass by the fluids which it absorbs and is often exceedingly uncomfortable to the wearer. I prefer antiseptic gauze to anything I have yet tried. It is easily

introduced and removed, adapts itself readily to the uterine cavity, imbibes fluids with avidity and allows them to drain, swells without becoming unduly hard, and if not too firmly packed does not usually cause discomfort. It should be inserted in strips an inch wide and 18 inches long, the cavity having first been sufficiently opened with a Sims or some other suitable dilator. It can usually be retained three days without danger or inconvenience from decomposition. Either plain sterilized or borated gauze may be used and I prefer one of these to the bichloride or iodoform gauze which is not without danger from toxic absorption. The tampon may be used both in the impregnated and the unimpregnated uterus and the conditions may be tabulated as follows:

I. The impregnated and puerperal uterus.

(1) During the period of gestation.

(2) During parturition.

(3) *Post partum* whether the labor occur at term or prior to it.

II. The unimpregnated uterus.

(1) Exploratory and operative purposes in connection with disease of the uterus and its appendages.

(2) Hæmorrhage.

(3) Endometritis.

(4) Stenosis.

(5) Accumulations within the tubes.

I. THE IMPREGNATED AND PUERPERAL UTERUS.

(1) During the period of gestation: There are many conditions associated with the impregnated uterus which have heretofore been treated, and with fair success, by tampon of the vagina the pressure of the tampon being the efficient agent. This method, however, is often indirect and troublesome, and should yield to the more logical and effective method of tamponade of the uterus. Of course there are cases in which a tampon of the vagina alone is indicated and yet others in which both uterus and vagina may be tamponned with advantage. Tampon of the uterus is indicated when an abortion is imminent or is necessitated. It may be employed for the purpose of bringing on uterine contractions and emptying the organ or it may occasionally be efficient in warding off an impending abortion. In the latter case it must be used with the greatest caution and wisdom. it must not be too firm, it must not extend beyond the *os internum*, it must be reinforced in most cases by a tampon of the vagina, and it must not be retained long enough to bring on labor pains. In cases of *placenta prævia* it will be of great service in checking hæmorrhage and will sometimes enable one to carry patients safely through gestation when otherwise great loss of blood or interruption of pregnancy would result. If an abortion is necessitated on account of uncontrollable vomiting, the presence of a dead fœtus, or serious mechanical obstruction in the birth canal, the use of the tampon seems to me entirely preferable to the means which have heretofore been in use for bringing on labor, whether bougies, bags, or tents. It is clean, it is efficient, it works with reasonable rapidity, it is less likely to produce injury to the uterus, or be followed by bad consequences than almost any other means for accomplishing the same purpose with which I am familiar.

(2) During parturition: In a prolonged first stage of natural labor in primiparæ and in others with whom the cervical tissues are unduly rigid the delay is often very vexatious both for patient and physician. There can be no objection to helping nature in such cases if it be done cautiously and discreetly. I am aware that this will be called meddlesome midwifery and would say in advance that if one is not familiar with operations upon the cervix uteri and with the use of instruments upon that organ he should by all means leave the case to nature or get suitable assistance. There are numberless cases, however, in which the life of a child might be saved and the welfare of the mother enhanced in the abridgement of pain and the avoidance of puerperal mishaps, if the first stage of labor were suitably

hastened. This may be done by placing the woman in Sims's position, when the pains have ceased, introducing a large Sims speculum, steadying the vaginal portion of the cervix with a volsella, carefully and slowly dilating the cervical canal with a Sims dilator, and then introducing a few strips of sterilized gauze into the canal as far as the lower pole of the advancing fœtus. The result is the same as that accomplished by the hydrostatic or air bags and enables one to dispense with these aids, which are so apt to be out of order at the very time they are needed.

(3) *Post partum*, whether occurring at term or prior to it: When Dührssen suggested the tamponade of the uterus for *post-partum* hæmorrhage, the suggestion was received with incredulity, almost with ridicule. To effectively tampon a bleeding, viciously inert uterus is indeed an operation for which one is ordinarily not prepared. The quantity of gauze which can be stuffed into such an organ is almost unlimited and there is no time to send for supplies when the emergency is at hand. But one can always carry half a dozen rolls of sterilized gauze bandages three or four inches wide and if this is insufficient clean pocket handkerchiefs or strips from napkins or pillow cases are almost always available. Of course there must be no suspicion of dirt about anything which is introduced into the uterus and the material must be removed at the earliest practicable moment. This operation has proved a life-saving measure in so many instances that it must now be regarded as one of the legitimate expedients in severe *post-partum* floodings. In hæmorrhage which occurs after abortion the intra-uterine tampon will be found quite as effective as in the similar accident at term and the operation in the former case can usually be done with more deliberation and precision than in the latter. In cases in which there is septic material within the uterus after labor or abortion, the intra-uterine tampon will sometimes be of service. In such cases curettage and irrigation are of equal importance with the tampon and may even be required in place of the latter. But the possibilities for usefulness which the tampon has in this class of cases can not be overestimated and I can speak with the greatest satisfaction and assurance of the valuable aid which it has rendered me in my practice. The tampon is also useful in cases in which the uterus contracts imperfectly or irregularly after labor or abortion, the condition which is commonly known as sub-involution. The tampon stimulates the uterus to contraction in such cases, relieves the turgid veins, effects good drainage, and may prevent protracted or even serious disease.

II. THE UNIMPREGNATED UTERUS.

(1) Exploratory and operative purposes in connection with disease of the uterus and its appendages: All forms of new growths are included in this category whether benign or malignant. In many cases the tampon will be unnecessary sufficient dilatation being obtainable by means of the Sims or other similarly acting dilator. There are cases, however, in which it is desirable to proceed slowly or to obtain a greater degree of dilatation than is warrantable by the rapid method, as in those in which intra-mural myomata are to be enucleated or others in which the uterus is to be removed for cancer, in which a preliminary curettage and tampon will better prepare the organ for safe removal and insure less danger from sepsis. In cases in which the appendages are to be removed for inflammatory disease and in which the endometrium is more or less involved in the same process, curettage and tampon of the uterus prior to the operation will often prove a useful measure especially by favoring drainage from the congested uterine vessels, the tampon being allowed to remain *in situ* two or three days. In general the field which has heretofore been occupied by the uterine tent, of whatever material composed, may be properly appropriated by the judiciously managed uterine tampon.

(2) Hæmorrhage: As I have already remarked, the vaginal tampon is often a clumsy and indirect means for the relief of uterine hæmorrhage, though there are many cases in which it seems to produce sufficient pressure to accomplish the desired end. To apply the pressure directly to the bleeding surface is far more rational,

and can usually be accomplished with as much facility as in the more indirect procedure. There are many forms of hæmorrhage for which this treatment is applicable. One which has heretofore been treated almost exclusively by the use of more or less nauseating drugs is the profuse menstruation in girls and young women, especially in those who are anæmic and can illy afford this exhausting drain upon their vital resources. Undesirable as the dilatation of the vagina and uterus in girls and young women may be from the sentimental standpoint, such a disadvantage is far outweighed by the benefits which are to be obtained by the effectual checking of the unnatural flow. The use of the tampon for such a condition must be accompanied by rest in bed and it may be necessary or desirable to administer an anæsthetic before the tampon is introduced. Hæmorrhage from the uterus requiring the tampon may also result from hypertrophy and inflammatory disease of the endometrium, congestion due to malignant disease or fibroid tumor, or to disease of the adnexa, retention of decidual membrane, etc. Curettage should be a preliminary procedure, though there are doubtless cases in which this step may be safely omitted. The quantity of tampon material which should be used and the period of time during which it should be continued, are questions which should be answered for each individual case.

(3) Endometritis: The endometritis with which hæmorrhage is the salient symptom has already been referred to, but there are other forms which do not present this symptom which are equally amenable to treatment with the curette and the tampon. Such are the suppurating form, the hypertrophic form, with excess of glandular secretion, and the form which is associated with inertia and atony of the uterine muscle and stasis of the venous circulation, the latter form being most frequently associated with subinvolution of the uterus and sometimes persisting months or years after the labor from which it had its origin. In all these varieties of endometritis the value of free drainage, depletion of the tissues of the uterus, and avoidance of absorption of decomposing and septic material can not be overestimated and their proper appreciation will tend to the solution of many disagreeable questions in connection with prevalent cases of uterine disease.

(4) Stenosis: The value and significance of mechanical obstruction within the uterine canal, especially with reference to the influence of flexions and versions of the uterus upon the outflow of its contained fluids have been the source of ardent controversy on the part of writers upon uterine pathology and therapeutics for many years. If the propositions enunciated in this paper in regard to drainage are based upon fact, they certainly apply to those cases in which stenosis of the uterine canal, either from congenital insufficiency or acquired malposition, prevents free egress of any fluids which may be within the uterine cavity. It is conceded that there are plenty of instances in which the canal is patulous while the secretions do not flow freely or at any rate are associated with dysmenorrhea, but this does not disprove the statement that narrowness of the canal or a bend in its course will prevent free egress of fluids. Furthermore, we have the positive evidence of experience, in many instances, that widening and straightening the canal does allow free exit to fluids and does result in relief to the pain which was periodically experienced before the change in the mechanical conditions was effected. It is therefore believed that such treatment rests upon entirely rational foundations and also that the intra-uterine tampon offers one of the best, if not the best, means for accomplishing this end. Whatever may be said in favor of stems and tents for the relief of stenosis, they are all open to objections of one kind or another and it is believed that in the tampon we have a substitute which can satisfactorily displace them all.

(5) Drainage of accumulations within the Fallopian tubes: The usefulness of the tampon for this indication seems to me to be very limited. As a means of depleting the uterus itself, even when the cornua are infiltrated, it serves a good purpose, as I have seen in a number of cases. Also as a means for the drainage of accumulations of pus, blood, or serum in those portions of the tubes contiguous to the cornua

it has decided value, but if the tubes are distended and displaced downward and fixed by adhesions in such a malposition and if they contain distinct loculi, separated from each other by impervious septa, the fluids which they contain would apparently be quite beyond the reach of any attraction which could possibly be exerted upon them by any substance with which the uterine canal may be packed. Such unfavorable conditions are far more numerous than the favorable ones and their treatment by temporizing or palliative measures may be not unattended with danger. Besides, inflammatory disease of the tubes is so often associated with similar disease of the ovaries that attempt to relieve the former by drainage, even if possible and successful, would in very many cases afford only half a solution of the problem under consideration.

Methods of using the tampon: Polk's broad proposition that the tampon should be introduced with all the precautions and all the adjuncts of any surgical procedure including the administration of an anæsthetic is, of course, susceptible of limitations. In the use of the tampon for the relief of post-partum hæmorrhage the urgency of the situation will forbid the deliberation and attention to details of a less serious condition and in many other cases in which the uterine canal is patulous, the tissue soft and dilatable, and the patient not unduly sensitive an anæsthetic will be unnecessary. I have proved this many times in office and dispensary practice. For other cases the safeguards which Polk mentions are timely and requisite.

It has already been suggested that the introduction of the tampon should be preceded, as a rule, by curettage, irrigation, and a sufficient degree of dilatation to allow the easy insertion of the gauze strips. Roughly speaking if the canal is half an inch in diameter the gauze may be inserted with little difficulty. The decubitus of the patient at the time of the operation may be left to the preference of the operator. I have sometimes used the lateral and at others the dorsal decubitus, while at others I have been obliged to change the one position for the other. The lower lip of the uterus may be steadied with a volsella, while an assistant steadies the upper lip. The gauze, in strips of the required length, may then be passed as high as the fundus with long dressing forceps until the entire cavity is sufficiently packed. The firmness with which it is to be packed should depend upon the condition for which it is used and its distensible property as the secretions are absorbed must not be forgotten. I have not been able to use Polk's canula for the introduction of the gauze advantageously, nor do I like to recommend the auger-tipped introducer which the same author employs. It is too likely to cause injury in unskilled hands and unskilled hands must frequently perform this operation. The tampon may be retained from one to three or four days, according to the indication, and it may be renewed as often as necessary. I have kept up continuous dilatation in a myomatous uterus with advantage for weeks at a time. No particular rules are necessary concerning the method of removing the tampon; it may be gently drawn out with the fingers or with dressing forceps. Concerning contraindications the tampon may be so modified as to quantity, firmness, and duration of retention that I am unable to conceive of the impropriety of its use in any case in which intra-uterine treatment is admissible.

DISCUSSION.

Dr. R. B. Maury, of Nashville, Tenn., said:

Mr. Chairman and Gentlemen: The remarks of Dr. Currier have fully opened to us a most varied series of cases in which the use of the intra-uterine tampon is necessary. There was a time, not very far remote, when we all hesitated to touch the uterus in an instrumental way whenever we found in the pelvis any evidence of present or past inflammation. Indeed, it is to the use of the tampon we are indebted to-day for our ability with comparative safety to attack the inflamed

uterus. It is not my intention, Mr. Chairman, to go into any further discussion of the paper than to add my testimony in regard to one class of cases that Dr. Currier alluded to. I refer to cases of septic infection following confinement. It happens to all of us to see cases of this character. Suppose a patient has had a perfectly simple labor; the physician merely expresses the placenta and that terminates the delivery. To his surprise on the third day she begins to have fever. There is nothing noticeable about the lochial discharge, but still the fever remains high. After a few days he places the patient in a proper position and he makes a digital examination, but he finds nothing in the vagina, but when he inserts the bi-valve very gently into the canal he finds a large amount of pent-up secretion in the cavity of the uterus. Curetting, packing with gauze, and drainage soon puts an end to this trouble. The benefit from this treatment has been most marked. I generally find that the use of a cervical cone is a great assistance in introducing the tampon.

Dr. G. Betton Massey, of Philadelphia, Pa., said:

Mr. PRESIDENT: I have been somewhat differently affected by this paper. It seems, if I understood Dr. Currier's paper, that the indications for the use of the intra-uterine tampon are metritis with and without hæmorrhage and also non-inflammatory conditions of the uterus with stenosis. In inflammatory diseases of the uterus I understood Dr. Currier to tell us that the best treatment is to stop up the uterus with gauze or cotton. I fail to see how he can call that drainage. In my experience such procedures always prevent drainage and there is a very unpleasant odor also attached to the material when withdrawn. And yet I will admit that some of these procedures accomplish good; it may be possible that the irritation of the plugs in this inflamed area may act as an alterative and that good may result in that way. I think, however, that much good may be accomplished without plugging up the uterus, especially in inflammation of the tubes, in which a genuine drainage is essential. It seems to me that when we have possibilities in our hands of accomplishing the same result by a more efficient method of treatment, that plugging up the uterus is not desirable. My experience in the use of the galvanic treatment in these cases has been very large and I have found that the best way to apply the galvanic current is by a slight imitation of the method of tamponing without the disadvantage of leaving the cervix plugged. I have my electrode made of absorbent cotton and moistened with some medicated solution and by introducing this into the cervical canal and applying the galvanic current cataphoretic drainage may be accomplished. The cotton covering the electrode is decidedly of advantage. There are other points of criticism to Dr. Currier's method besides my objection to plugging up the uterus. A contrasting advantage of the electrical treatment over the intra-uterine tampon, is that much less interference with the uterus is necessary when we use the galvanic current. We do not have to make an operation out of it; we do not have to use dilatation. Even in stenosis we do not have to dilate the cervix. Another advantage which the use of electricity has over the other method is the ease with which the treatment can be carried out. One application a week will cure those cases as compared with the constant placing and replacing of the tampon. This is one of the most convincing arguments in favor of the galvanic treatment.

Dr. Joseph Taber Johnson, of Washington, D. C., said:

Mr. PRESIDENT: I have been very much pleased and instructed by the paper of Dr. Currier, and so far as my own experience has gone (it has not been nearly so thorough as Dr. Currier's in this plan of treatment) I can indorse his statements. I have never attempted to use the tampon in the uterus in all the classes of cases mentioned by Dr. Currier, but so much good has been accomplished by the use of dilatation and curretage of the uterus and the use of the tampon of gauze in the vagina, as recommended by Pope and others, that we are in a position to extend the usefulness of this means, so successful in the treatment of those cases which have

defied treatment so long. I have used the intra-uterine tampon once or twice in cases of post-partum hæmorrhage and I have been surprised to see the quantity necessary to fill the uterus. In one case, where death was expected, the uterus was finally stuffed with iodoform gauze (about a square yard) and then with handkerchiefs and napkins until the uterus was filled, a kind of Mickulitz pouch tampon. I knew that Dr. Massey would recommend the use of electricity, but electricity is not under discussion. In cases of salpingitis associated with endometritis and occlusion of the tubes so as to cause dilatation and collection of fluid, I have no doubt that by the drainage and contraction set up by the foreign body in the uterus the condition might be relieved, and that finally the use of the tampon for this condition may come to be substituted for more radical operations. In cases of threatened abortion, where we have fears that the patient may abort, I think that a pledget of cotton in the vagina may do good. We may tampon the vagina and leave the patient and come back in a few hours. But we have to use so much gauze to fill the vagina that if a tampon in the cervix will accomplish the same ends it is very much better. I would not say, with Dr. Massey, that the uterus was plugged up in such a case or that these fluids were retained in the uterus, but that by means of the capillary attraction of the tampon a large amount of fluid is drained out.

Dr. Ernest W. Cushing, of Boston, Mass., said:

Mr. PRESIDENT: I have heard with great interest the paper of Dr. Currier, and with most of it I should decidedly agree, especially as regards the great value of the intra-uterine tampon in the parturient uterus and after abortions. I am glad to hear Dr. Johnson's experience in plugging the uterus for hæmorrhage and I think his idea of using handkerchiefs, napkins, etc., inclosed in a sack of iodoform gauze, a very valuable one. There are one or two points, however, in which I differed with the author of the paper, and I gladly seize the opportunity to agree with Dr. Massey, an opportunity which rarely presents itself, in regard to the use of the tampon in cases of stenosis. I do not know what would be the effect of using the tampon without the curette, as I have never tried it. I used to use a glass cervical tube to straighten out anteflexions, but I soon found that they were unnecessary, and now, following the example of Martin, I dilate and curette the uterus thoroughly, then wash it out with an antiseptic solution. The uterus, as is well known, will empty itself through a very small opening. For the purpose of washing out the uterus the double-current irrigators are useful instruments. Before every operation I do I curette the uterus; if I repair a cervix I always curette the uterus, and consequently I have a great many curettings to do. Every time I perform an operation upon the uterus, whether it be for repair of the cervix or to correct a congenital anteflexion or stenosis, I always precede it with dilatation, curettage, and irrigation of the organ. The principal thing is to get the uterus cleared and well washed out.

Dr. A. Vander Veer, of Albany, N. Y., said:

Mr. PRESIDENT: I did not have the pleasure of hearing Dr. Currier's paper, but I know that whatever Dr. Currier presents is interesting and instructive and I know that on this subject of packing the uterus he is certainly right. I have had some experience in this line of work during the last six years. I came just in time to hear Dr. Massey's remarks. I expected him to talk about electricity and I think he is wrong when he says that the uterus is not well drained by the intra-uterine pledget. I believe, with Dr. Cushing, that in lacerations of the cervix the uterus should be curetted before the operation. I have had some little experience in the use of electricity in years gone by. Fifteen years ago I followed it up with earnestness, but my experience has taught me that electricity does not bring about the good results which Dr. Massey describes so earnestly. I believe that in this method of dilating, curetting, and packing the uterus the profession is pursuing surgical methods and is on the right track.

Dr. J. H. Carstens, of Detroit, Mich., said:

Mr. PRESIDENT: Dr. Currier's papers have always interested me very much indeed, but it seems to me that this doctrine of packing the uterus, like a great many other procedures, is very much of a fad. Some great authorities like Dr. Currier naturally drop into the rut, but the fashion goes out into the country, the general practitioner takes it up and thinks it can be done without danger and he proceeds to pack the uterus because it is "the thing." When you can get vinegar in every house, Mr. President, I do not see the use of the tampon. Placenta prævia is the only condition I know of where the tampon is indispensable. It is all very well for Dr. Currier, or Dr. Vander Veer, or for you, Mr. President, to pack the cervix, but the general practitioner, who has not acquired your *tactus eruditus,* will only get himself into trouble by attempting it. He thinks it is so simple, so easy; but what is back of it? Inability to diagnose the case properly and lack of experience and skill in applying the remedy is where the trouble comes in. We dilate the uterus, we curette the uterus, we wash it, we use iodine, carbolic acid, etc., and we kill every germ in the uterus; then we keep the vagina clean. That patient will get well without any drainage. What does the tampon drain if you do use it? Why, simple serum. If I wanted to drain the uterus at all I would use a glass or silver drain; but drainage is not necessary if you simply clean out the uterus; that is all you need do. If I wanted to keep the uterus straight in order to give the muscles and ligaments a chance to regain their tonicity I would put in a stem pessary, which would answer the same purpose as the intra-uterine tampon in such cases and would be far safer. In my opinion, serious results will follow the general use of the tampon. In rare cases where the tampon is good, all pelvic troubles must first be carefully excluded, because pustules and other pelvic troubles might be overlooked, and fatal inflammatory sepsis would ensue. The aim should be to make the uterine cavity aseptic. This can be done by curetting and cleansing the cavity with iodine, carbolic acid, etc.

Dr. Currier, in closing the debate, said:

There is very little, Mr. President, that I wish to add to what I have already said in my paper, but I desire to thank the gentlemen who discussed it for the very courteous way in which they handled the subject. My main object in reading the paper was to emphasize the importance of the principle of drainage, as everyone, whether his practice be general or special, is called on to apply it. In regard to the principal objection raised by Dr. Massey, that the tampon sucks up serum instead of draining it, that point was answered by Dr. Johnson, who explained it on the principle of capillary attraction. If you use a material which does not drain of course it is not the proper material, but there is never any trouble in this regard when gauze is used. There is another point which I wish to emphasize and that is the use of this principle of packing and draining the uterus in those cases of natural labor in which septic troubles follow, and I wish to dwell on the importance of this treatment in just such cases. Dr. Carstens objects to this method on the ground that the tampon drains nothing but serum; but what of that? To get rid of this condition is just what what we are after, and it seems to me that he has not accomplished his full duty unless he gets rid of this material, which will not run out of its own accord. All will admit that there are cases in which the curette is not admissible, and in those cases the tampon has a place. I do not claim that it will displace the curette, but I think it has a very wide field of usefulness and that much disease may be averted by its use.

ECTOPIC PREGNANCY IN THE LATER MONTHS.

By Dr. JOSEPH TABER JOHNSON, of Washington, D. C.

The treatment of extra-uterine pregnancy in the earlier months is no longer a vexed question. So little has been accomplished by either medicine or electricity that the laity as well as the great bulk of the profession have come to regard cœliotomy and total removal of the gestation sac as the surest and safest treatment. Electricity, especially in cases of doubtful diagnosis and in districts remote from skilled operators, has its advocates, and very properly so, as much less harm will be accomplished by its use than by unskillful surgery in an unsafe environment. No doubt exists in any well-informed mind as to the advisability of the radical operation in all ruptures of the gestation sac even in the desperate cases. To wait for reaction while internal hæmorrhage is exhausting vitality and resorting to opium and stimulants, is no longer practiced by intelligent men. The folly of this worse than inaction has had such a ghastly array of fatal results that it would take a brave man to counsel delay.

But the case is different when ectopic pregnancy has passed beyond the fifth month, and the child is known to be viable. The possibility of favorable development and the final removal of a live child greatly complicates the situation and the question may and often does assume ethical and theological aspects, which may possibly never be definitely settled. Where these considerations embarrass an already difficult surgical indication, the solution of the problem will ever remain more difficult than where simply doctors disagree. If it were certain that this development would proceed without accident after the ectopic pregnancy has passed the Rubicon of the first half of gestation there would be little doubt of the wisdom of delay; but the possibilities of a suddenly fatal termination are so great that no dependence can be placed in this doctrine of chance, which amounts to worse than gambling with human lives intrusted to our care. Unfortunately for the child, we can only be reasonably sure of the present moment so far as our patients are concerned and I am glad to see the brightening indications that point toward the same opinion which the profession has reached in regard to placenta prævia. Few well-informed men live in this age who do not believe that the woman's only safety lies in the complete evacuation of her uterus, at the earliest possible moment when the placenta is prævia, after a diagnosis has been made. The roads marked "delay," "leave to nature," and "expectant treatment" are so filled with tombstones and bereaved relatives and friends, that the deluded and timid advocates of these delusive and fatal practices find little room to navigate their lonely way. Medicine not being an exact science, we are unable to promise favorable results in all cases; but with the recent wonderful advancements of abdominal surgery we can do much more than our fathers could to save human life, even when threatened by the dangers of advanced ectopic pregnancy. The great difficulty in dealing with the placenta has detained many from operating until two or three months after the child was known to be dead, and the placental vessels are so certainly atrophoid as to avoid the danger of hæmorrhage. Even in these cases the doctrine of chance has not a few advocates. Some women have lived many years with a mummified fœtus and have finally died of something else. Others have survived the results of decomposition, abscess, and discharge of fœtal bones through bladder, vagina, rectum, and abdominal wall, and why can not more women survive these dangers? But the statistics of Shauta clearly show that many have died from the immediate effects of visceral perforation, or from the exhaustion resulting from ulceration and discharge, or remained permanent invalids.

The chief object of this paper is to recommend the removal of an extra-uterine fœtus in all cases as soon as the diagnosis is made, and the gestation sac and placenta whenever possible, whether it be the second, fourth, seventh, or ninth month. If the child can be saved the victory is still greater. As in placenta prævia, the

dangers increase with the development of the placenta. The greater surface to bleed, the more the danger from hæmorrhage. In some cases it may turn out to be safest to follow standard authority and leave the placenta undisturbed with its tied cord protruding from the lower end of the wound and subsequently remove it after its circulation has dried up. If no sepsis occurs the cord may be left to come away piecemeal or become encysted and absorbed as occured in two cases reported by Lawson Tait.

In May of this year Lusk reported thirteen cases, including one of his own, where cœliotomy had been performed with the fœtus living in the second half of ectopic pregnancy, viz: Those of Briesky, Brown, Eastman, Jessup, Rein, Lazarewitsch, Lusk, Martin, Olshausen, Shauta, Taylor, Treub, and John Williams. A study of these pioneer cases and their careful analysis by Lusk shows that in the evolution of this operation we are already getting beyond the realm of chance in dealing with the placenta and are successfully attacking its intrenchments in the rear by enucleation and ligation of its vessels beyond the placenta, the general ooze from the united small vessels and torn surfaces being compressed by packing with iodoform gauze after the separation and delivery of the afterbirth. Lusk saved his patient by vigorously compressing the abdominal aorta while completing the placenta separation, and a final packing of gauze in a Mikulicz pouch. Jessup and Taylor left the placenta untouched with cord hanging out the lower angle of the closed abdominal incisions. In Jessup's case the putrescent placenta was two months and a half in discharging itself and curing the patient. In Taylor's the abdomen had to be reöpened on the twelfth day, on account of the gangrenous condition of the cord and symptoms of septicæmia. The hæmorrhage following the separation of the afterbirth "was with difficulty controlled by the pressure of a large sponge wetted with a dilute solution of perchloride of iron. It took her three and a half months to get "quite well." Lusk says: "Both these cases belong to the domain of miracle and do not invite imitation." Olshausen, by tying the vessels in the broad ligament beneath the placenta was able to remove it completely without hæmorrhage. Fernwald found the placenta attached, not only in the folds of the broad ligaments, but to the under side of the uterus. He tied the vessels in the ligament and clamped and removed the portion of the uterus which bled. A few stitches and some iodoform gauze saved the day. The patient was discharged cured in two days more than two months. John Williams and Treub's cases did not vary much from Jessup and Taylor's. Martin first deliberately and intentionally tied the vessels beneath the placenta and by the side of the uterus, in the seventh month of ectopic pregnancy, and removed this organ without loss of blood. He closed the sac above and drained through an opening below, punched through the cul de sac into the vagina. Briesky and Eastman both operated successfully in the eighth month, removing the entire ovum. They ligated the vessels under the placenta. Eastman "was able to clamp the uterine end of the tube and the broad ligament and to cut away the portion which contained the ovum." In February, 1890, Prof. Rein, of Kiew, successfully enucleated from the peritoneum an eight months' fœtus with placenta and membranes in the same manner as we enucleate an intra-ligamentous ovarian tumor. It will be seen by the foregoing evidence that, as in ovariotomy, hysterectomy, and appendicitis, this operation is undergoing the various stages of evolution, resulting finally in the saving of more than a dozen women and a number of the children. We are in a position at least to say that women far advanced in ectopic pregnancy need not be left without a surgical hand outstretched to help them and their worse than unborn children; and on the theory that "what man has done, man may do," we can now advise, with a clearing conscience, cœliotomy and complete removal of the fœtus, placenta, and membranes. Though a large majority of these operations have been done abroad, Eastman and Lusk have added luster to the already bright reputation of American surgery by their brilliant operations. There is much ground for the hope and belief that Pan-

American surgeons may equal if not excel in this as well as in other branches of abdominal surgery.

I beg your indulgence to the narration of the brief histories of two cases in which I operated, in one eight and the other twelve months after conception.

In the first case the patient was aged 32, white, the mother of three children. Her periods had been regular for several years. After missing two months she had all the symptoms of tubal rupture and was dangerously ill for several weeks. After recovery her abdomen began to enlarge upon the same side and continued to grow for five months. She had some of the symptoms of pregnancy; but no one thought in the country where she lived that she really was with child. Seven months from the first missed period she began to fail in health and was treated for malaria and subsequently for typhoid fever followed by peritonitis. She came to Alexandria for better treatment and came under the care of Drs. Jones and O'Brian, who requested me to see her in March last, after discovering an abdominal tumor. I found an invalid, pale and emaciated, with a pulse of 130 and a temperature 96 in the morning, and 104 in the afternoon, with night sweats, frequent chills, no appetite, and unable to walk out of the house. She had a well-defined tumor in her left side which we all believed to be undergoing suppuration and to be the cause of all her troubles. She was thoroughly septic. No one made a positive diagnosis, but all agreed that an operation offered the best chance of recovery. The usual preparations were made and the abdomen was opened. Most extensive adhesions were encountered in all directions. A fluctuating point in the tumor was tapped, and a quart or more of most offensive gray-colored fluid came away. In proceeding with enucleation of the tumor my fingers tore into the sac and a child's foot and leg protruded. The opening was enlarged and a macerating and decomposing eight months' fœtus was easily removed with the placenta. The specimen is now preserved in the Army Medical Museum. It was found to be impossible to cleanse the sloughing sac and stitch it to the abdominal wall as I wished to do as it tore open in several places and putrilege was freely admitted to the abdominal cavity. Much time was spent in separating dense adhesions from the bladder, uterus, and ligament. The abdominal cavity was finally made clean and the wound closed with a glass drainage left in. The patient never rallied, and died on the next day. I believe now if a correct diagnosis had been made and the sac incised, the fœtus and placenta rapidly removed, and the sac well stitched to the peritoneum, cleansed, and packed with gauze, the patient would have recovered.

Case No. 2.—Mrs. B., age 36, mother of two children, the youngest 11 years of age, menstruated in the latter part of March, 1892. Early in May, while at the house of a friend, she was suddenly seized with violent pains in the hypogastric region, passing backward to the rectum. A physician was summoned, who gave a hypodermic of morphia, and made hot applications to the abdomen and perineum. One month later there was a similar attack. There had been no appearance of the menses since March. On examination the physician found a large mass between the vagina and rectum, which was very sensitive to the touch and which he thought to be a tumor. She informed the physician that she thought she might be pregnant, but in this view he did not concur. Several attacks of less severity occured at intervals of about three weeks. Early in August movements of the fœtus were felt and this, of course, established the existence of pregnancy.

In the latter part of November there was said to be an escape of about 2 ounces of liquor amnii. On the 5th of December about a pint escaped and there was evidence of the onset of labor. After this date no signs of fœtal life were manifested. On the 23d of January it was determined to bring on labor and a gum catheter was introduced 10 inches and permitted to remain thirty-six hours, when another was substituted for a similar period without provoking uterine contractions. After consultation the patient was etherized and the cervix dilated until the smallest size Barnes' bag could be introduced, but beyond this nothing larger could be inserted. The doctor said he introduced his finger into the dilated uterus and felt the child. No labor followed these efforts and the lady decided to come to Washington, where I saw her February 23 at her father's house. External examination of the abdomen revealed the fœtus lying in an oblique position, the larger and lower extremity being in the right iliac fossa, the smaller to the left and above the iliac crest. Internal examination detected cervix apparently corrugated in a longitudinal direction. The patient was kept under observation and March 16 she called at my office for further examination. Her pulse had ranged for weeks from 90 in the morning to 120 in the afternoon. Through the speculum I passed a sound 2 inches, but could not make it pass farther. March 21 Dr. Jos. Taber Johnson was called in consultation with Dr. T. C. Smith. The existence of intra-uterine pregnancy was doubted until the physician who had charge of the case stated that he had actually felt the child in utero when he introduced his finger after the dilatation with Barnes' bag. Dr. Johnson thought, notwithstanding the history given by the Nova Scotia physicians, where

Mrs. B. resided, that the case was one of abdominal pregnancy and Dr. S. C. Busey was added to the consultation. He could not decide whether the fœtus was inside the uterus or not. With two fingers against the cervix, it was felt to move when the tumor was pushed about with the other hand applied externally. The patient was now twelve months pregnant. She came to my private hospital April 6, 1893, and was anæsthetized on the following day and the uterus demonstrated to be empty and of normal size. I familiarized myself, as much as possible, with the tumor and its environment. A week later I opened the abdomen in the presence of Drs. Adams, Bowen, Smith, Fry, and Stone. The omentum was adherent to the tumor, but easily separated. Passing my hand down into the right iliac fossa I found to my delight the mass was not adherent and immediately lifted the bulk of the tumor out of the abdomen. The uterus and right ovary, tube, and broad ligament were free. The fœtus had developed in the left tube until rupture and then in folds of the left broad ligament. From underneath, the unbroken gestation sac was enucleated and rolled out on the table, only one vessel needed ligation. Much of the ligament was trimmed off and ligated close to the uterus. No cleansing of the cavity was required and no drainage tube. Abdomen quickly closed and patient put in bed in half an hour. She sat up on the twenty-first day and went home on May 18, one month from the date of her operation and recent letters report her perfectly well. She lives near Halifax, where her husband is the American consul. Upon opening the specimen it was found free of amniotic fluid and contained a full-term fœtus with its placenta and membranes, and is preserved in the Army Medical Museum in this city.

DISCUSSION.

Dr. Joseph Price, of Philadelphia, Pa., said:

Mr. CHAIRMAN: I agree with Dr. Johnson in most of his statements on the subject of extra-uterine pregnancy. It seems quite appropriate that I, a native of Virginia, should return to that State where the operation for the relief of ectopic gestation was first performed, in order to discuss this paper of Dr. Johnson's on that subject. As long ago as 1790, William Baynham, in Virginia, operated on Mrs. Cock, the wife of a planter, removed an ectopic pregnancy, and saved his patient. Nine years later, in 1799, he found the same condition in a slave, and operated upon her successfully. I suppose he had to insure her owner against loss, and he would probably have had to pay for her if he had lost her. Baynham thus did two deliberate operations after diagnoses of extra-uterine pregnancy and I claim for America the proud distinction of having originated the operation. It remained for Tait to reëstablish the same treatment later. The attempt of some operators to establish rules of procedure with a single experience, in cases of operation for the removal of an extra-uterine pregnancy, reminds me very much of the action of some of my students after their first abdominal section. Many times I have given my student my knife and made him perform a section. I notice in a few days that he is getting broad-shouldered, big-headed, etc., then he wants to modify my whole set of instruments. (Laughter.) Standard authorities! Please tell me what standard authorities have ever done for ectopic gestation. The so-called ancient authorities did absolutely nothing for it. With an experience derived from eighty-six cases in my own practice, I would not be willing to lay down hard and fast rules for the operation in late cases approaching full term. As to the removal of the placenta, there are a few surgeons now sitting by me who have seen everything flooded in a few seconds and obscured by blood. I saw my brother attempt to remove a placenta not long ago, but immediately everything was overflowing with blood and he would have sacrificed his patient if he had insisted on extirpating it. This case was profoundly septic for several weeks. Some three or four weeks later I attempted to remove the placenta, but as soon as I had gone down a very short distance into the abdomen the whole cavity was flooded by blood. When the placenta remains in the sac or tube, or about the broad ligament, it can be and should be removed, but when it is firmly implanted on the bladder or intestines, iliac fossæ and living, it should be left alone. If the placenta has ceased to live it should be removed; if hæmorrhage

occur, firm pressure or a sponge packing, followed by drainage, will control it. Enucleation of the sac or broad ligament has never been done by Dr. Johnson nor anyone else. Just think one moment and you will see that it is impossible. Dr. Johnson's case ruptured into the broad ligament, but when it ruptures into the abdominal cavity with a grafting of placenta on all surrounding viscera, enucleation becomes a trying matter. Eastman says he tied his sac off and succeeded in making practically a complete enucleation. Surely he had a tubal sac. Martin did precisely the same thing, but if the placenta had been living and out of its sac it would have been impossible; neither Martin nor anyone else could have done it. Martin says he tied under the placenta, but there must be an error in that statement. My opinion is that if Dr. Johnson had simply removed the fœtus and washed and drained the cavity he would probably have saved his patient's life. I have found the child floating in the abdomen. It may live in the abdomen a long time. In my brother's last case, the baby was being digested alive and its skin was peeling off. Those very cases where a man declares he has stitched the sac are the favorable cases for enucleation. As to enucleation, if the product of conception remains in the tubal sac enucleation is fairly easy and safe, but if the rupture has taken place into the abdominal cavity and the placenta has become engrafted on new structures, it is an extremely dangerous operation if the child is living. My brother's case got well after a long sepsis. Our distinguished chairman once said that in one of his cases everything disappeared in a few seconds when he attempted to remove the placenta.

To return to a few points in the paper. I agree with Dr. Johnson that all these cases belong to surgery. There is only one treatment, first, last, and all the time, and that is the removal of the gestation sac, and its removal whenever found, whether at the seventh, ninth, or thirteenth month. There is also but one person to be considered and that is the mother. All this talk about saving the child is pure sentiment. What is the use in saving the child when 50 per cent are deformed, generally club-footed, and nearly all of them die in one or two days? My remarks are now directed to Mr. Tait. There is no surgeon, living or dead, whom I admire more than Mr. Tait. He has done more for abdominal surgery than all the rest of the world, but in this matter of trying to save the child he is governed more by sentiment than by surgical wisdom. As to the use of electricity, I do not believe in it. It is wiser to counsel the country physicians to just open the sac, remove the fœtus, clean out the cavity, and leave a place for drainage, and he will do very much better than he could with any amount of tinkering with electricity. In all cases of death of the fœtus, shrinkage and maceration follow. The removal of placenta and sac in this group is easy and safe. The removal of a living fœtus and a growing placenta, if growing out of the sac, is an exceedingly dangerous procedure; the cases are easily classified. Again, it is easy to determine what it is best to do before operation if you can settle the matter of living or dead fœtus. In early ruptured tubal pregnancy, up to the fourth month, there is but one operation, removal of the clot, irrigate, and drain.

Dr. Ernest W. Cushing, of Boston, Mass., said:

Mr. Chairman: While Dr. Price may have had 100 cases of extra-uterine pregnancy, there might still be another differing in every way from any of his. It makes one modest to refer to 2 cases of ectopic gestation when another man has had 86. I wish to refer to one case occurring in my practice where none of us could detect any signs of fœtal life, but nevertheless we at last decided that it was really a case of extra-uterine pregnancy. I was afraid of hæmorrhage if I operated at that time and I would be afraid now if I had a similar case, so I decided to wait until the child was dead beyond a doubt and the circulation in the placenta had entirely ceased. In this case we were entirely successful, it may have been bad surgery; but at all events it worked well. When the abdomen was opened, four weeks after the diagnosis was made, I found a child at the ninth month of pregnancy. It had grown in the tube, which had formed a pocket or cup-like cavity. The child lay in

the abdominal cavity surrounded by a thin membranous sac. When this was opened and the child was removed the placenta protruded, of which I tore away the free portion. I was thereby emboldened to remove the entire placenta, which I did. This was accompanied by a very profuse hæmorrhage, which was stopped with gauze packing. The abdominal cavity was thoroughly cleaned out and packed with gauze, and a drainage tube inserted into Douglas' pouch. The abdomen was then closed, the tubal cup being stitched into the wound, and the woman got well. This was a case which set me thinking as to whether Tait's statement was correct, for there was no history of a secondary rupture having occurred. I had another case last week which afforded me much instruction. The woman had a tubal pregnancy of three months' duration. There was hæmorrhage from the abdominal end of the tube, and a quantity of dark fluid blood was in Douglas' pouch, which was shut off by adhesions. If the child had gone on growing I do not see why it should not have become similar to my first case. I do not believe that all the cases of extra-uterine pregnancy which go on to full term are between the folds of the broad ligament, as Tait claims.

Dr. G. Betton Massey, of Philadelphia, Pa., said:

Mr. Chairman: I would not have projected myself into this discussion but for the remark of Dr. Price that there is but one treatment for extra-uterine pregnancy, removal of the gestation sac. I have records of two cases treated by electricity: In one the death of the fœtus and great reduction of the sac resulted after some weeks' treatment and in the other the patient was hastily operated on one month after the cessation of a week's electrical treatment. The cause of the second operation was a hæmatoma. When the abdomen was opened it was found that the head was macerated and was disappearing by absorption. This woman would have gotten well without this operation, as everything was found in good condition. I agree with the statement of Dr. Johnson that in some cases when expert surgery is unavailable, and, I would add, even when expert surgery is available, the electrical treatment is best because the patient might die under the application of surgery. Of course, the use of the knife is the proper method of procedure in some cases, and always when the bones are formed, and the only reason why the use of powerful currents through the vagina into the sac is better is that it has the advantage of being safer, even if not so sure to result in complete absorption. The use of electricity will kill the fœtus and save the patient from rupture of the sac. I have a little doubt about surgeons being accurate as to the statistics of operations and I would like to ask Dr. Price how many patients have survived the operation. As to the failure of electricity to cure these cases, that is generally due to the fact that sufficiently strong currents have not been used. Electricity should be the sole agent used in the treatment of extra-uterine pregnancy for the first three or four months. Dr. Price has remarked upon the dangerous nature of the operation when the placenta is embedded in the intestines. The death of the fœtus should precede any operation, as this would lessen to a great degree the danger of hæmorrhage; hence it is always proper, and often best, to use the electrical method even in late cases, as it makes safe any subsequent operation that the case may demand.

Dr. I. S. Stone, of Washington, D. C., said:

Mr. Chairman: The paper of Dr. Johnson should not call up a discussion of the uses of electricity in ectopic gestation. I do not think we should branch out. The advisability and best method of suppressing hæmorrhage from a beginning of the separation of the placenta is a question of paramount importance. I recall two cases of extra-uterine pregnancy in my practice, the patient in the first case being a young woman, 26 or 27 years of age. She was so much exsanguinated that she looked like a subject of phthisis. I examined her lungs and throat, and at first thought she was dying of consumption. The pregnancy had gone to the fifth month, and the sac, which was in the broad ligament, was unruptured. I had her removed to

the nospital, where she passed a cast of the uterus, and it was then that I found that the pregnancy was in the broad ligament. In this case the pulse was almost imperceptible and I did not think she would survive the operation. What was to be done had to be done quickly, owing to the woman's low state of vitality, so the operation consumed only fifteen minutes. The hæmorrhage was continuous and everything in the field of operation was dark and the sac was very much distended with blood from partial separation of the placenta. Gauze was packed in on top of the placenta, the hæmorrhage was checked, the sac sewed to the peritoneum, and the patient made a splendid recovery. In the second case, occurring in a woman otherwise healthy, the pregnancy had lasted three and a half months and the fœtus, as in the first case, was dead. I removed the sac, tied all bleeding points, and the woman recovered promptly.

Dr. J. H. Carstens, of Detroit, Mich., said:

I think, Mr. Chairman, that the general plan laid down in the paper of Dr. Johnson as to the method of treatment of extra-uterine pregnancy is a most excellent one. It is not always good practice to remove the placenta and I have had several cases where I did not try to remove it. There is one thing I want to indorse. As Dr. Price says, the only correct thing to do in a case of extra-uterine pregnancy is to remove it. I recall the case of a woman on whom I operated for peritonitis with pus tubes and when I opened the abdomen I found a fœtus of three months. She had been treated six years ago by electricity; but, as was shown by this case, electricity does not always cause absorption of the fœtus. Another case which I had, had been treated seven years before by electricity, but I found the fruit of conception in her abdomen and it had always been a source of trouble. If a proper diagnosis had been made in the first place and instead of monkeying with that buzz saw, electricity, she had been operated on, she would have been saved untold suffering all those years.

Dr. Joseph Price, of Philadelphia, Pa., said:

Everyone present here, Mr. Chairman, knows that I claim that electricity has no place in the treatment of ectopic pregnancy, nor in gynecology. Dr. Johnson recommends the removal of the gestation sac, but I believe that if he had simply removed the fœtus in his case he would have saved his patient. In my opinion, had he not attempted to remove the entire sac the result would have been different.

Dr. I. S. Stone, of Washington, D. C., said:

Do I understand that Dr. Price does not recommend the removal of the sac if the case is seen in the early months of pregnancy?

Dr. PRICE: No; while the placenta lives (and I want to emphasize the fact that it lives; it does not grow) it should not be removed, but when the fœtus, sac, and placenta have all ceased to live and have shriveled up, then removal is easy and proper. Early in tubal pregnancy everything should be removed—tube, fœtus, and sac. I want to discuss one of the two cases alluded to by Dr. Massey; the case which was operated on for hæmatoma. This lady was subpœnaed by one of our courts as a witness and while in the court room was seized with a violent pain in the region of one of her ovaries. (Medical literature is full of such cases. Dr. Douglas, of Nashville, relates the case of a lady who was out shopping, when she was seized with a severe pain in her abdomen. She was carried into his office near by, where she was examined by a student who thought it was a case of ruptured tubal pregnancy. She died in a few minutes.) This lady was carried home from the court room. Dr. Massey followed her shortly afterwards and treated her by electricity and says he destroyed the fœtus. This is an error; the fœtus died in the court room when the rupture occurred and the electrical applications, made a number of times, had no fœtus to destroy; the fœtus was dead long ago. Recurring hæmorrhages followed, and section was performed and the woman recovered. A few hours after the event in the court room I offered my operating bag to her doctor, and urged him to return and not let the woman die from hæmorrhage. Dr. Massey

followed afterwards and treated her by electricity. Before Dr. Formad investigated the pathology of extra-uterine pregnancy there was not a coroner's physician in the country who would give a certificate of death from extra-uterine pregnancy. They would call it "accidental hæmorrhage," because they failed to recognize the precise nature of the trouble—the ruptured tube, the seat of hæmorrhage, etc. But Dr. Formad found them in large numbers and in one case he found a little Irishman sitting on the pancreas. There is nothing but direct positive surgery to be thought of in these cases, first, last, and all the time. I remember one case where a fœtus was found on top of a gravid uterus. In conclusion, I will answer Dr. Massey's question as to the mortality in my operations. I have had a series of 86 cases, with 3 deaths. (Applause.) I lost only three, but more should have died. Some patients die who ought to live, and again, some live who, by rights, should die; but I still feel I should have saved the other three. It is folly to speak of those patients who are treated according to Dr. Massey's method as having been saved by electricity; it is by surgery they are saved. A good number of those treated by electricity are not tubal pregnancy. With an experience of only two cases, one doubtful, the other an error until surgery determined the precise nature of the trouble, Dr. Massey should keep silent. As yet he has no data from which to speak with authority. I should not rise to discuss this subject with a limited and doubtful experience of two cases.

Dr. Johnson, in closing the discussion, said:

I have nothing to say, Mr. Chairman, except to express my pleasure that so much attention has been paid to my paper. A slight suspicion has crept into my mind that Dr. Price regards me as in the same category as his students with the big head, but I really felt quite modest in presenting my paper to the session. There was one point made by Dr. Price which I would like to dwell on, and that was his statement that it was not possible to enucleate the sac when it had ruptured into the folds of the broad ligament. I supposed that the ligament grew to accommodate the growing sac and it seems to me that what I did in the case of my surviving patient was really an enucleation from the folds of the broad ligament.

THE TECHNIQUE OF TOTAL EXTIRPATION OF THE FIBROMATOUS UTERUS.

By GEORGE M. EDEBOHLS, A.M., M.D.,

Professor of Diseases of Women at the New York Post-Graduate School and Hospital; Gynecologist to St. Francis Hospital, New York.

The minority of all cases of fibroma or myoma of the uterus calls for any treatment, either medical or surgical. When treatment is called for, the author believes surgery is invariably to be preferred to any and every other method of therapeusis. This statement, of course, is based on the assumption that whatever method of treatment, medical or surgical, be decided upon will be carried out by those most competent in that special method. Small submucous fibromata that can be safely removed through the cervix and vagina are best dealt with in that way, provided that the entire disease can be thus eradicated. This latter proviso will obtain, however, in only very exceptional instances as compared with the total number of fibromata demanding operative interference.

Salpingo-oöphorectomy, celio-myomectomy, and celio-hysterectomy are the other surgical resources, in the rising scale, at our command. Each has its proper indications and place. To enter upon a discussion of these indications is not the purpose of this paper. In relation to the two former, removal of the ovaries and tubes, and enucleation of the tumor or tumors with added salpingo-oöphorectomy, the author merely wishes to state that his results obtained from these methods have

been sufficiently satisfactory to warrant him in the continuance of their employment in properly selected cases of fibroma and myoma of the uterus.

When hysterectomy is the only alternative left, total extirpation of the uterus has always appealed with stronger force to the writer's ideas of surgery than amputation through the cervix, no matter which of the many methods now in vogue of disposal of the resultant stump, either extra or intraperitoneal, be resorted to. So strongly has this conviction swayed the author's practice that he has absolutely no experience with the treatment of the stump in abdominal hysterectomy, all of his cases of hysterectomy having ended in total extirpation of the uterus.

Just here I may be permitted to allude to the misuse of the term hysterectomy, an abuse sanctioned by long usage. Hysterectomy means literally cutting out the uterus and there is nothing in the term which would justify a rational application of it to supravaginal amputation. The term hysterectomy having been thus (mis)appropriated to denoted supravaginal amputation, I have been in the habit, for some years past, of using the tautological term "panhysterectomy" when speaking of total extirpation of the uterus. While this expedient was perhaps excusable in view of the circumstances and in the transition period of the development of the subject, the time has now arrived when, in the interests of clearness and a correct nomenclature, the term hysterectomy should be reserved to apply to total extirpation of the uterus; celio-hysterectomy and colpo-hysterectomy to denote, respectively, extirpation via the abdomen or via the vagina. The author is convinced that the adherents of hysterectomy, as compared with supravaginal amputation, would increase in number were it not that total extirpation is generally regarded as the more dangerous operation. That it is not more dangerous, and quite possibly even less dangerous in competent hands, larger statistics may, from present indications, soon be expected to show. That total extirpation is a more difficult operation the writer also believes to be an opinion based upon prejudice and want of familiarity with the procedure. The main object of this communication is to detail a technique of total extirpation of the fibromatous uterus which, albeit in a limited experience, has proven entirely satisfactory to the writer, and without further delay I will address myself to my subject.

The patient is placed in the lithotomy position and the vagina thoroughly disinfected in the usual way. The cavity of the uterus is disinfected, as far as possible in each individual case, by means of superficial curettage and irrigation with 1:2000 sublimate solution. The uterine cavity is packed moderately with antiseptic gauze, usually 1:1000 sublimate. The vagina is next packed tightly with 1:1000 sublimate gauze and the patient changed to the Trendelenburg posture. The abdomen is opened above the pubis by an incision just large enough to permit the delivery of the entire tumor. If the ovaries and tubes are found healthy, or at least not containing pathologic secretions, the escape of which would threaten infection of the peritoneum; if the uterine tumor not too large, extending but little, if any, above the umbilicus; and if it does not weigh above four kilogrammes, the entire uterus with the tumor or tumors, tubes, and ovaries is removed in one piece after the following method: The tumor is delivered through the abdominal incision and pulled as far as possible out of the pelvis. A transverse incision is made through the peritoneum covering the anterior surface of the uterus from one broad ligament across to the other. This incision runs about three centimeters above and parallel to the reflection of the peritoneum from the uterus on to the bladder. The point of reflection is plainly indicated by a white, fibrous-looking transverse line. A similar transverse incision is carried through the peritoneum on the posterior surface of the uterus. The two peritoneal flaps thus marked out should be large enough to easily cover the defect in the pelvic floor left after removal of the uterus. The peritoneal flaps are next stripped from the surface of the uterus. In doing this the bladder and ureters are carried forward with the anterior flap well out of the way of harm during the further steps of the operation. The next step is the ligation of the uterine artery on either side. The arteries are secured by a subperitoneal mass

ligature of stout catgut, carried well down to, but not into, the vagina. The distention of the vagina by the gauze packing makes this an easy matter, a point for counterpressure being afforded by the gauze. In passing the ligatures in this, as well as in all other operations upon the broad ligaments, I prefer the excellent and most convenient ligature carrier devised by Dr. Clement Cleveland to all other instruments. The broad ligaments are tied off by two further catgut ligatures on either side, one embracing the round ligament and the other the infundibulo-pelvic ligament and ovarian artery. The cutting out of the uterus, tumor, and appendages in one piece between the ligatures is now an easy and bloodless procedure. If the mass ligature of the uterine arteries has been correctly applied no bleeding will result, even from the divided vaginal arteries. The six ligatures are cut short and the knots turned downward toward the vagina in the next step of the operation, the closing of the gap in the pelvic floor. This is effected by uniting the anterior and posterior peritoneal flaps by a transverse, running Lembert suture of catgut extending from the stump of one infundibulo-pelvic ligament across to that of the other, securely shutting off the peritoneal cavity from the vagina. The peritoneum is dry-cleansed with sterilized gauze, the abdominal wound closed without drainage, and the patient returned to the lithotomy position. The gauze packing is removed from the vagina and replaced by a loose dressing of gauze applied in such a manner as to drain the supravaginal subperitoneal space. The patient is now ready for bed.

Modifications of the above plan are called for by certain conditions. Thus, if the ovaries or tubes present evidences or suspicion of containing infectious material, they should be tied off and removed the first thing after opening the abdomen. If the tumor extend above the umbilicus, weighing more than about four kilograms, pass a rubber ligature around the cervical part, after stripping back the peritoneal flaps, amputate the bulk of the tumor, cauterize the cervical canal with the Paquelin or a tablet of corrosive sublimate, and remove the cervix in the manner described above. If multiple or intraligamentous fibromata fill the pelvis, make room by enucleating the fibroma or fibromata most in the way, and proceed as above.

The technique of total extirpation of the uterus above advocated is believed to possess the following advantages:

(1) The danger of infection from the uterus or vagina is entirely avoided, or at least minimized. The cleansing of the vagina and uterus and packing the latter with gauze is a measure of precaution against infection which I take previous to all cœliotomies, for whatever cause, in which there is a possibility that the uterine cavity may be opened from the abdominal side during the operation. In operating for the removal of fibromata the uterine cavity may be opened in the enucleation of a tumor or in amputation of the bulk of the tumor and it may make the difference between life and death to find it in an aseptic condition.

(2) The uterine arteries are secured with ease and certainty. The distention of the vagina by the gauze packing enables us to carry the mass ligature well down to the vagina and to include the supply to the upper end of the vagina as well, so that there will be no bleeding of the vaginal arteries after cutting out the uterus.

(3) The operation is practically bloodless. With the exception of the incision through the peritoneum fore and aft, no part is divided until its blood supply has been secured.

(4) The danger of wounding the bladder or ureters is reduced to a minimum. These organs are lifted with the anterior peritoneal flap well out of the field of operation.

(5) The closure of the peritoneum is as perfect as it can be made, its *status quo ante* is restored, and no foreign body is left in its cavity.

(6) The after-treatment required is practically *nil*. My patients have generally left bed at the end of two, and hospital at the end of three, weeks.

The author has performed total extirpation of the uterus for fibromata but six

times, the last four cases being operated upon after the above-described method. All of the six patients recovered from the operation, though one died a sudden death some time afterwards as a result of degenerative changes of the muscles of the heart antedating operation. The time required for the first of the four operations performed as described in this paper was one and a half hours. The last three were performed in or within an hour, the time being reckoned from the beginning of disinfection of the vaginal tract until the patient was ready for bed, and including the curettage of the uterus, the cleansing of the abdominal walls and two changes of position, from the lithotomy to the Trendelenburg and back. None of the tumors, however, were exceptionally large. They varied from fifteen to twenty-four centimeters in average diameter and between three and a half and five and a quarter pounds in weight. The smallest reached to within three centimeters of the umbilicus, and the largest extended to some five centimeters above the navel.

It is with extreme diffidence I present this paper, based, as it is, upon such a limited experience, before such a body of representative men, many of whom number operations of this character by the score. It is in the hope of eliciting a discussion, from which we may all derive benefit, that it is hazarded.

HYSTERECTOMY, INDICATIONS AND TECHNIQUE.

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It is not proposed to discuss in this paper the etiology of the various conditions for which this operation is performed, nor shall the symptomatology and diagnosis occupy more space than is incidentally necessary to the consideration of the indications for the procedure; these points are too thoroughly settled to admit of further debate. The points which are still in dispute are among those which will arise during the study of this subject. It is not always safe, in forming conclusions, to draw one's inspiration from a promiscuous collection of statistics, for the reason that it is well known how loosely many of these are reported and how thoroughly unreliable some of them are on account of the desire of the reporter to make as good a showing as his neighbor, in consequence of which many essential facts and truths are omitted. General statistics will, therefore, be ignored and whatever deductions are drawn will be entirely from the author's personal experience, which now includes seventy-seven hysterectomies. The indications, as taught by this experience, are absolute and relative. They are: (1) Malignant degenerations of the uterus. (2) Fibroid tumors of the uterus. (3) Pelvic inflammations. (4) Prolapse of the uterus. (5) Inversion of the uterus.

Malignant degenerations of the uterus.—The indications here are absolute, both as to the advisability of the operation and as to the complete removal of the organ, it matters little how high the death rate or how high the percentage of recurrence. The disease is incurable and the end certain under any other line of treatment. However small the number of cases cured may be, yet it is an undisputed fact that a certain proportion regain permanent good health. Should this number of fortunate ones be limited even to one or two in the hundred operated upon, it would be sufficient justification. When one considers the great relief which follows a simple curettement of a cancerous uterus, it can well be imagined how much more thorough and prolonged this relief is when the whole organ is removed. The number of permanent cures will be in direct ratio to the period at which surgery is employed; the earlier in the disease the uterus is removed the more chance of obtaining a satisfactory result. For this reason, when, from a careful study of the symptoms and history of a given patient, a reasonably strong suspicion of malignant disease exists, other conditions being rigorously excluded,

the uterus should be removed. The justification for acting upon such advice will rest largely upon the mortality attendant upon the operation as undoubtedly, under these circumstances, an occasional nonmalignant uterus will be removed. This will matter little in comparison with the number of patients saved a miserable death and even though the organ prove not to be cancerous, it will be a diseased one, giving rise to alarming symptoms, from which speedy and permanent relief will be obtained.

Twenty-five operations have been performed for primary cancer or sarcoma of the uterus; this number does not include those cases of malignant changes in uterine neoplasms, all of which are considered with the fibroid tumors. Of this number three have died from the operation. The three deaths were all preventable, and would not be likely to occur in another series of the same number. Two of them were the first two operations for vaginal hysterectomy ever performed by the writer. Single clamps on each side of the uterus were used for securing the broad ligaments; in both cases the clamps worked in a faulty manner and one of the ovarian arteries retracted from the grasp of the clamp after being cut. In one case it was necessary to open the abdomen in order to secure the bleeding vessel. The third death resulted on the fifth day after the removal of the uterus and the use of catgut ligatures. The patient was exceedingly restless, the usefulness of the catgut being destroyed by its absorption, the light adhesions gave way and the stumps, which had been stitched into the vaginal opening and which at this time were sloughing, retracted into the pelvic cavity setting up a septic peritonitis which proved fatal in twenty-four hours.

Experience and a more perfect technique would guard against the repetition of a death similar to the first two; heavier catgut and more thorough suturing, together with a judicious restraint of a restless patient with drugs, would guard against a repetition of the last-mentioned accident.

Fibroid growths.—The indications for surgical treatment of these conditions are relative. If the tumor be small, is of slow growth, and gives rise to no untoward symptoms, it should be allowed to remain unmolested, provided the patient may be in such a state of life that she is not necessarily exposed to conditions which predispose to inflammatory complications and that she be not liable to change her place of residence to such quarters that she will be unable to obtain competent surgical aid should there be a future demand for it—a demand which will almost always be made sooner or later. Should the patient have advanced to within a few years of the menopause, it may be advisable to adopt, for the time being, the expectant plan of treatment. Under all other conditions a fibroid tumor of the uterus, however small, should be subjected to surgical treatment. Surgical treatment having been once decided upon, hysterectomy is the proper procedure to adopt. Myomectomy may in rare cases be the more desirable procedure, but can only be considered where the patient is of such an age as to make it desirable and possible for her to bear children and where the uterine appendages are healthy and capable of performing their function. The reverse of this is true in the case of the majority of fibroid tumors. Under all other circumstances hysterectomy is the operation of choice. The withdrawal of oöphorectomy from the category of operations applicable to the treatment of fibroid tumors is based on the fact that it, equally with hysterectomy, renders it impossible for the woman to conceive; it not only allows the tumor to remain *in situ* for nature to absorb, with the chance, however slight, of this not occurring; but it usually leaves behind a diseased and useless uterine cavity and uterine walls, all of which may be gotten rid of surely and permanently at one stroke by the hysterectomy. Oöphorectomy is often more difficult than hysterectomy, and is not infrequently impossible.

Hysterectomy as the operation of choice will, as in the case of malignancy, depend upon the mortality. The writer has removed 41 fibroid uteri by means of this operation. Of this number 4 patients died, 3 after the supravaginal amputa-

tion of the stump and 1 after complete extirpation. In the one case death was inevitable from the previous septic condition of the woman, due to electro-puncture. Two of the deaths were due to pulmonary complications; acute congestion of both lungs in the case of one, ending in death within the first twenty-four hours, and a double pneumonia of the second resulting in rapid filling of both lungs and death within several days. These two deaths occurred in hospital practice within a few days of each other and at a time when there was an epidemic of pulmonary complications following all kinds of operations in the house. At the time of the deaths there were in the house six or eight cases with lung troubles, some of whom were sick enough to cause considerable anxiety, and on some of whom only plastic operations had been performed. The epidemic abated as abruptly as it commenced. The fourth death was due to septic peritonitis in a case of complete extirpation, and was undoubtedly due to faulty technique, a cause which is entirely preventable.

Pelvic inflammations.—The indications in pelvic inflammations are relative. All operators are having patients, whose uterine appendages they have removed for this disease return only slightly or not at all better. The women suffer with their old pains, leucorrheal discharges, and hœmorrhages. In two such cases the writer has subsequently removed the uteri with complete relief of all the symptoms. In two other cases the uterus, together with its appendages, has been removed at the first operation, with a perfectly satisfactory result. In no case was there a death.

In pelvic inflammatory disease in women the infection has first invaded the uterine cavity. In very many cases the endometrium remains permanently diseased, and the uterine walls have become invaded by inflammatory products, even with pus. In many cases of pyosalpinx the tissue is so diseased that the ligature cuts through like a knife even when it is placed well up on the uterus. It is no more to be expected that uterine walls diseased to such a degree will regain their normal condition than to expect the same of the tubal walls under like circumstances. The mortality of hysterectomy under these circumstances should be no greater than after the removal of the appendages alone. This procedure should therefore be the operation of choice in all cases where the uterine walls are infiltrated with pus and the uterus materially enlarged.

Prolapsus uteri.—The indications are relative. All cases in which the usual surgical means have been tried and failed should be subjected to hysterectomy as a sure means of cure. Women who are suffering from old complete prolapse, near, at, or past the time of change of life, are proper subjects for this procedure. Future child-bearing need not here be taken into consideration. The only questions to be considered are: first, whether or not the usual plastic operations give promise of a cure; second, the mortality of the operation. As to the first, it is well known to all operators that plastic operations, even when accompanied by a ventrofixation, at times fail. As to the mortality, the uterus has been removed six times by the writer by vaginal hysterectomy without a death and with complete success in each instance. Cases which are particularly applicable for this treatment are those with greatly enlarged and hypertrophied uteri, measuring five and six inches in depth, presenting profuse uterine discharges and hæmorrhages. These uteri are not infrequently found to be cancerous, such being so in the case of two of the six reported. The operation should always be followed by plastic operations on the anterior and posterior vaginal walls for a repair of the relaxation of the vagina.

Inversio uteri.—The operation is only applicable to old, chronic cases, and only then when judicious attempts at replacement by taxis and elastic pressure have failed. Taxis should not be tried longer than half an hour, with the patient under ether. If at the end of this time there is no sign of beginning return, elastic pressure should be resorted to either by the colpeurynter or Aveling's repositor. Should these fail after several days' trial, vaginal hysterectomy is a proper and safe procedure. One case has been successfully treated in this manner by the writer.

The methods of performing hysterectomy are abdominal, vaginal, and the combined methods.

Abdominal hysterectomy is performed by (1) supravaginal amputation; (*a*) treatment of the stump by the extraperitoneal method; (*b*) dropping the stump; (2) extirpation.

Vaginal hysterectomy is performed by (1) clamp operation; (*a*) single clamp; (*b*) multiple clamps; (2) ligature operation.

All cases of prolapse and inversion of the uterus, all malignant uteri sufficiently small, and very small fibroid tumors of the uterus are proper subjects for the vaginal operation. Fibroid tumors, excepting the very small ones, large malignant uteri, and all cases of inflammatory uteri should be subjected to the abdominal operation. The combined method is superfluous and more dangerous than either of the other two alone. In the hands of the writer vaginal hysterectomy with the use of the catgut ligature has proven the safest and most satisfactory of the vaginal operations. With the clamps there were four operations with two deaths, with the catgut ligature there were twenty-seven operations with one death. Where the operation is performed for prolapse, the ligature operation and stitching the stumps in the opening in the vaginal fornix is absolutely necessary to success. The broad ligaments are thus made to act as guy ropes from above and give infinitely better support, with less chance of stretching, than would be the case if ventro-fixation or Alexander's operation had been relied upon.

When the abdominal operation is performed in the presence of malignant disease complete extirpation is necessary. In all other cases the supravaginal amputation is preferable. Extirpation is a longer and somewhat more tedious operation, and in addition the subsequent condition of the vagina is that of a considerable shortening. The advantages of this procedure over the amputation do not compensate for these disadvantages. The uterus was removed by complete extirpation five times with one death.

As between the two methods of treating the stump, dropping it back into the pelvic cavity is preferable to treating it by the extraperitoneal method. The mortality is much the same, but other considerations all turn the balance in favor of the intrapelvic method. The extraperitoneal method is not applicable to intraligamentary growths. Twenty-eight operations were performed and the stump treated extraperitoneally; of these two died. Thirteen cases were operated upon and the stump allowed to retract back into the pelvis; of these patients one died.

The supravaginal amputation accomplishes all that extirpation does; is applicable, with the exception of malignant uteri, to all conditions and diseases; is less difficult and tedious of performance; has less danger of septic infection, due to the smaller opening of the cervical canal than of the vagina; and, finally, has less mortality. After the ovarian and uterine arteries are ligated and the uterus amputated, the cervical canal should be cauterized by means of the Paquelin cautery, closed by catgut or fine silk sutures, and the edges of the cut peritoneum closed over the stump.

Hysterectomy is a difficult operation, however performed, and should never be undertaken by an incompetent operator. The mortality following the operation when properly performed should to-day be much less than is indicated by seven deaths in seventy-seven operations. It must be borne in mind that this mortality includes the accidents incident to gaining the requisite experience in manipulation, as well as those necessary to perfecting the technique. The convalescence following hysterectomy is, in the majority of cases, as easy and uninterrupted as that following ovariotomy. A few more years will see the field of applicability of this operation greatly widened, the more so as the mortality decreases. The uterus is a useless organ in all cases where the ovaries or Fallopian tubes have been removed and is only too frequently a source of discomfort, invalidism, and death. The technique of vaginal and the two varieties of abdominal hysterectomy, com-

FIG. 5.—Supravaginal amputation of the uterus. First step: Ovarian arteries ligated.

FIG. 6 —Supravaginal amputation of the uterus. Second step: Ovarian and uterine arteries ligated and uterus amputated.

FIG. 7.—Supravaginal amputation of the uterus. Closure of the cervical canal with sutures.

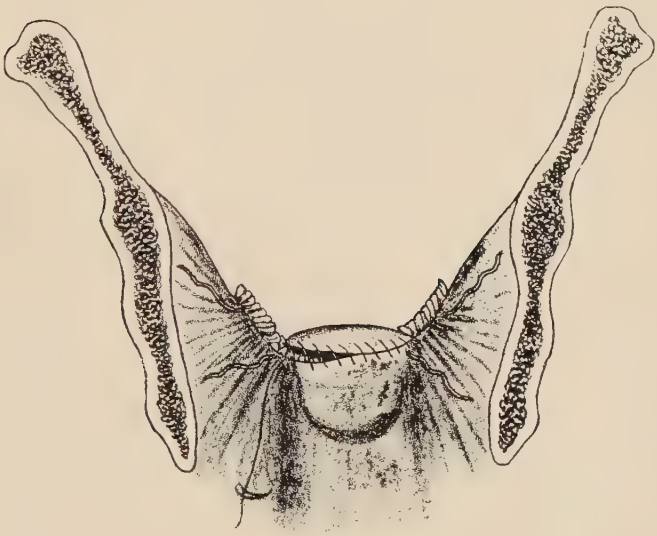

FIG. 8.—Supravaginal amputation of the uterus. Suture of the peritoneum over the cervix and stumps.

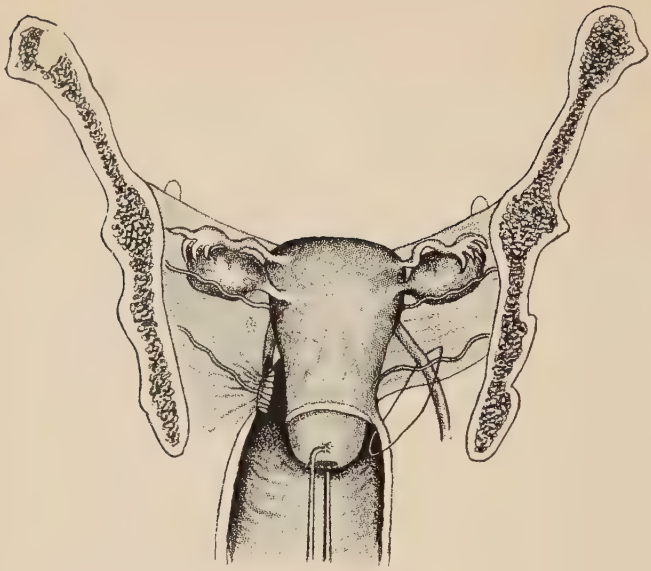

FIG. 1.—Vaginal hysterectomy with the ligature. First step: Ligation of uterine arteries.

FIG. 2.—Vaginal hysterectomy with the ligature. Second step

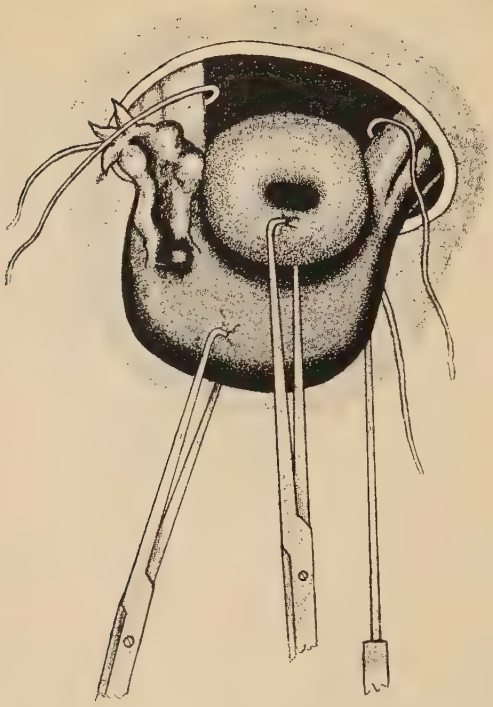

Fig. 3.—Vaginal hysterectomy with the ligature. Third step: The fundus inverted into the vagina, and the final ligatures in place.

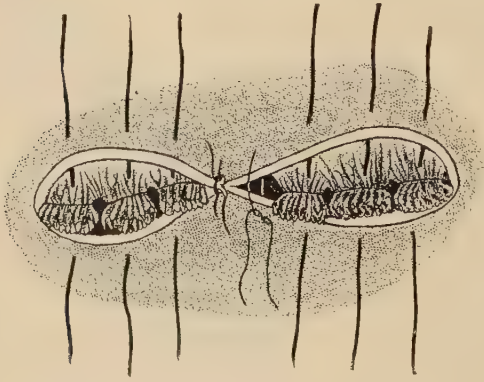

Fig. 4.—Vaginal hysterectomy with the ligature. Final step: Uterus removed and stumps drawn down into the vagina; sutures in place ready for closing the vaginal opening.

plete extirpation, and the intrapelvic treatment of the stump after supravaginal amputation, have many points in common. In each operation the important point is to secure in separate ligatures the two ovarian and two uterine arteries; everything else is subordinate to this. Rigid antisepsis is absolutely necessary.

Vaginal hysterectomy.—The patient being placed in the dorsal position, the perineum is well retracted with a Sims speculum. The cervix uteri is grasped with a pair of tenaculum forceps and drawn down. The vagina about the posterior portion of the cervix, from broad ligament to broad ligament, is cut loose with a few strokes of a knife and its peritoneal and mucous coats quickly whipped together by a continuous suture to prevent bleeding. The vaginal mucous membrane is now incised on the anterior aspect of the cervix, from broad ligament to broad ligament, well below the attachment of the bladder. The connective-tissue attachments of the bladder to the cervix are loosened by forcing the finger between them and the uterus until the peritoneum is reached. This membrane is quickly penetrated by forcing a pair of blunt hæmostatic forceps through it into the peritoneal cavity and withdrawing them after having first widely separated the blades. Where it is possible the mucosa and serosa are stitched together, as was done posteriorly. The uterus is now entirely free from all its attachments excepting the broad ligaments. A succession of ligatures are placed upon these on each side, beginning from below, and cutting the uterus free from the ligaments as each successive ligature is placed and tied. Three ligatures usually suffice for each broad ligament. The first one secures the uterine artery; the second includes the balance of the ligament up to the ovarian artery, which, after being tied and cut away, frees the womb sufficiently to allow of inverting the fundus into the vagina; it is thus a simple matter to place the final ligature, which, on each side, includes the ovarian artery. The ligature should be placed on the outer side of ovary and Fallopian tube, so as to allow of cutting between them and the pelvic wall; in this manner both tubes and ovaries are removed with the womb. The uterus being removed, the three stumps on each side should be drawn well down into the vagina and the vaginal opening closed about them, the sutures being so placed as to pass through the stumps, thus fixing them in their drawn-down position. When the operation is finished nothing is seen in the vagina but the protruding stumps. The vaginal canal is douched with mercurial solution, well dried, and lightly packed with iodoform gauze, which is to be removed in the course of a few days. Catgut ligatures are used throughout.

Supravaginal amputation, with intrapelvic treatment of the stump.—The abdomen is opened in the median line, the patient being in Trendelenburg's position, with the intestines well back in the abdomen and the pelvis empty. A ligature is placed on each side of the uterus, close to the pelvic wall, including as much of the broad ligament as possible; a ligature to temporarily prevent bleeding from the uterus is placed close to that organ. After cutting between these ligatures and drawing the womb up a second ligature is placed, if necessary, on each side, so as to include any remaining broad-ligament tissue, to the level of the pelvic floor. These attachments are also severed. The uterus being well drawn up, the uterine artery on either side is located by the finger and a ligature placed under it close to the uterus. After securing this vessel on both sides the uterus is removed as low down on the neck as possible, the amputation being made wedge shaped. As soon as this is accomplished the cervical canal is cleaned with the knife or a Paquelin cautery and the cut surfaces of the neck are brought together by several sutures. The peritoneal edges are now whipped together by a running suture from side to side of the pelvis, burying under it the cervix and all the stumps but the ones including the ovarian arteries. Even these may be covered by doubling the loose peritoneum over them from side to side by the aid of a few sutures, thus completely covering up all raw surfaces.

Complete extirpation.—The steps of this operation are the same as the preceding up to the point of amputation of the uterus. Instead of this procedure the attachments about the cervix are freed and the uterus removed entire. The peritoneal reflexion between the uterus and bladder is incised from side to side, and the bladder connective-tissue attachments gently sundered with the finger or the handle of the knife. The vaginal sheath, being reached, is opened, and with a finger in the vagina it is no very difficult matter to free the attachments from the complete circumference of the cervix. This being accomplished, the edges of the vagina are brought together by a continuous suture. Thus any danger of infection getting into the raw surfaces from that canal is obviated. The peritoneal edges are sutured in a similar manner as in the preceding operation, all the stumps but the topmost ones being turned into the space between the vagina and peritoneum. Silk is used for the ligatures on the arteries, catgut for all suturing.

Drainage in any of these three operations is superfluous.

DISCUSSION.

The CHAIRMAN. Before proceeding with the discussion of these papers the chair will take this occasion to announce that he feels that he was a little remiss in his duty yesterday in allowing the discussions to take so wide a range. In future we will confine our discussions to the subject of the papers under discussion. The chair would also suggest that the discussion of that portion of Dr. Baldy's paper which treats of vaginal hysterectomy be deferred until the next subject is taken up, and that so much of the paper as relates to myofibromata be considered now in connection with Dr. Edebohls's paper on Cœlio-Panhysterectomy.

Dr. EDEBOHLS. I see by the programme that there are some papers on suppurative diseases of the pelvic organs, and I would suggest that they be discussed later.

Dr. BALDY. All discussions postponed from the session at which the paper is read do not amount to anything at all.

The CHAIRMAN. The papers of Drs. Edebohls and Baldy are now before the section for discussion.

Dr. E. J. Bolt, of New York, said:

Mr. PRESIDENT AND GENTLEMEN: The very able papers which have just been read have been very interesting and instructive to me. I shall start out at once by saying that in discussing a subject of such wide range as extirpation of the uterus we must draw a sharp line of difference in regard to the prognosis. We can not accept the figures in Dr. Baldy's paper for the reason that he has included operations for all kinds of tumors and because the two classes of operations have, as a rule, been taken as a matter of necessity in many instances, whereas the class of tumors varies. Dr. Baldy has taken into consideration tumors of all kinds and they differ so greatly as to their mortality that it is not fair to include them all in one discussion. Dr. Edebohls, on the contrary, has confined himself to one line of cases and operative procedure; his method of treatment can be discussed much more intelligently. He has discussed only supravaginal or complete extirpation of the uterus. I have no comments to make on Dr. Edebohls's paper, the technique is perfect. Martin, of Berlin, was the originator of the method as carried out by Dr. Edebohls, but his treatment has been modified in some particulars by Dr. Edebohls. Again, Dr. Edebohls packs the vagina with gauze, which will permit him to work entirely from above without the finger of an assistant below. I must denounce the operation from below entirely, except when the nature of the case makes that the more feasible route. There is one class of cases where the operation from below is preferable and that is where we have an unyielding pelvic floor or where we have a tumor low down and the pelvic floor rigid. In these cases

the operation can be done quicker and we will get better results than by the abdominal operation alone. Again, when we have a tumor developed in the lower segment of the uterus or in the posterior wall of the cervix, so that we can not get enough tissue for a stump, then the operation for total extirpation is the only one which should be considered. When we get a woman who has lost a great deal of blood, that woman will not stand the shock of complete extirpation as well as she will supravaginal hysterectomy. The mortality of total extirpation is so exceedingly great that we shall be doing extremely well if we reduce it to 15 per cent.

Dr. J. H. Carstens, of Detroit, Mich., said:

Mr. CHAIRMAN: I think Dr. Boldt has really about covered all the ground in his discussion. We can not lay down any abstract rules for treatment. Dr. Edebohls, with his nice institutions and Trendelenburg postures and favorable surroundings can do these operations; but I would like, or rather I would not like, to see the operation attempted by the great majority of surgeons. We must adapt our treatment to the circumstances attending each case. As to the use of the clamp or ligature in operations, I believe that the treatment by the clamp is best. A great many patients may be saved by the use of the clamp, whereas they would be lost if the ideal operation of Dr. Edebohls were attempted.

Dr. Charles P. Noble, of Philadelphia, Pa., said:

The question of the proper treatment of fibroids, Mr. Chairman, is one of interest to all at the present time. I have been very much pleased by the technique laid down by Dr. Edebohls, because the amount of blood lost by that method is very little. I must agree also with those who have said that it is applicable only to simple classes of cases, cases where the tumor is small and can be easily delivered. My experience in total extirpation has been limited, so that my objections must be theoretical rather than practical. My opinion is, however, that abdominal amputation is better than total extirpation, because of the greater simplicity of the operation. In my operations I begin by ligating the broad ligaments (using clamps alongside of the uterus and cutting between ligature and clamp) and instead of three ligatures on each side I use four, five, or six, as I believe it necessary to use that number in many cases. Having reached the uterine arteries I tie them off, passing the ligature well down along the vagina, when the tumor can be cut off without trouble and without fear of hæmorrhage. In one of my operations I had to stitch the bladder over the cervix, because it was not possible to form the usual peritoneal flaps. The main question in supravaginal hysterectomy is as to the nature of the stump. The profession has got into the habit of speaking of the intra and extra peritoneal stump, but in the method used by Baer the cervix is not the stump at all, the broad ligaments are the stumps. It is a mistake to say that we have no stump in total extirpation; there are two stumps, the broad ligaments. In my experience ovariotomy for fibromatous uteri has been very successful, as I have done the operation seventeen times for this indication and in only one case out of the seventeen does the patient now suffer, a case in which the tumor, from its size and position, acts like a ball valve in the pelvis, thus interfering with defecation. With that exception all my cases did well.

Dr. I. S. Stone, of Washington, D. C., said:

Mr. CHAIRMAN: My experience in the new operation of removing the uterus entire has been limited to seven cases, nearly all of which were done in the last six or eight months, and I have had only two cases to the credit of Baer's, or, as I believe it should be called, Goffe's operation. In regard to the technique as laid down by Dr. Edebohls I have nothing to say, as I consider it beyond criticism. I recall a case where an operation was begun for the removal of the ovaries to check the growth of a large tumor. Large sinuses compelled the entire removal of the tumor, which was done successfully. In one case I removed a tumor which weighed twenty pounds, but I lost my patient from mesenteric hæmorrhage. I wish to thank

Dr. Edebohls for his suggestion in regard to tamponing the vagina, and I consider myself well repaid for having attended the Congress by having learned that one point.

Dr. Stone then exhibited a uterine staff or elevator which he had designed, which was intended to facilitate operations from above and to take the place, to a certain extent, of the Trendelenberg posture. The instrument had a cup like that of a Babcock uterine supporter with a stem to be introduced into the cervix by an assistant during the operation. The operator can cut down on this with comparative safety. He said that the Trendelenberg posture allowed of perfect work where there is a movable tumor and when the light is good, but where those conditions are wanting his staff accomplished nearly the same end by throwing the uterus high up in the pelvis.

Dr. Andrew F. Currier, of New York, then addressed the section. He said:

Mr. PRESIDENT: Too high praise can not be accorded the method described by Dr. Edebohls and which I think might, without impropriety, be called the New York method, for the reason that it is favored by a large number of New York gynecologists. I have done this operation in three cases and have assisted others in a number of additional cases. I have nothing to add to nor criticise in the technique as laid down by the author, except that instead of the preliminary packing of the vagina with gauze it is my habit to wait until the vagina has been incised from above and then introduce the packing from that point. As to the statement made by Dr. Noble that stumps are left in this operation, I think that is open to exceptions, and for these reasons: The peritoneum is stripped from the front and rear of the uterus, the leaves of the broad ligaments are separated, and the separation is extended up as far as the round ligaments, and, of course, practically nothing remains to form a stump. Having reached the uterine artery and ligated that in continuity we have nothing to slough, and there are no nerves impinged on. The suggestion made by one of the authors (Dr. Baldy) of closing the vagina is objectionable. There is another point already touched on by two speakers, that there is a class of cases where the operation of total extirpation is inadmissible, and that is where the patient is very anæmic and has been losing blood for a long time. This class of patients is illy suited to withstand long operation. I have a patient of this class on hand now who is to be operated on this month. The ideal operation can not be done in these cases. Our highest aim should not be to do an ideal operation, but to save the patient's life. Hegar's operation for the removal of the tubes, which requires but a short time for its performance, is the best operation in these cases. Afterwards, when we are sure the condition of the patient has improved, another and more radical operation may be done. I have found Dr. Edebohls's operation of supravaginal hysterectomy the most desirable one in cases of cancer. With the Trendelenberg posture we can reach the diseased tissue and do better work than if we operate through the vagina. The only objection to that operation is that it is sometimes very difficult to dissect away the peritoneum. The peritoneum and peritoneal tissue are so firmly united that it is extremely difficult to separate them.

Dr. Henry O. Marcy, of Boston, Mass., said:

Mr. PRESIDENT: I labor under the embarrassment of not having heard the papers of Drs. Edebohls and Baldy, but I think that perhaps, after all, that need not interfere with an intelligent discussion of them. Sydney Smith used to say that he preferred to review a book before reading it, because then he was entirely unprejudiced. In 1880, when I first published a paper on uterine fibromata, their histology and surgical treatment, I strongly advocated the intraperitoneal treatment of the pedicle after resection. At that time my views seemed a bold innovation, and I found few, if any, operators who were willing to adopt them. The subject under discussion is quite too large for satisfactory treatment, and its importance is well evidenced by the number of distinguished men present and their interest in the prolonged debate. When myomatous tumors of the uterus of moderate size are rapidly develop-

ing in young subjects, it may be accepted as the general verdict of the profession that the removal of the appendages should be taken into favorable consideration, since the operation is of minimum danger and is usually followed by an arrest of the growth and great improvement in the condition, often by complete restoration to health. When the tumor has developed in a way to cause an elongation of the cervical portion of the uterus it may not be difficult to treat the stump extraperitoneally by fixation of the pedicle into the lower angle of the wound. Under such conditions the surgical manipulation is easy and recovery usually rapid. However, every operator knows that this class of cases is usually small, and that the great majority of the sufferers who resort to the surgeon have developed pelvic growths, which are more or less fixed and so attached that extraperitoneal treatment of the pedicle in the lower angle of the wound is impossible. It is this class of cases which the authors of the papers place before us for discussion and with whose views I for the most part agree, since I have for many years operated by methods essentially the same as those advocated. A signal advantage, however, is often gained by placing the patient in the Trendelenberg position.

The abdominal incision must be sufficiently long to admit of free access to the tumor, which must be lifted from the pelvic basin sufficiently to admit of the ligation of the great vessels on either side. Often the larger growths, for they are generally multiple, may be enucleated in order to furnish more room. It is usually wise to commence upon either side above the selected site of the division of the pedicle and dissect down the peritoneal envelope to the cervical structures. These can often be reduced to a size not larger than the two fingers. Through this base it is better to sew with a double, continuous, tendon suture before division. After resection a drop of liquid carbolic acid applied to the cervical opening makes safe disinfection. The reflected peritoneal cuff is resected to the desired size and closed with a continuous, Lembert, parallel suture. This inverts the peritoneal surfaces over the stump and at the same time completely buries the tendon suture. The abdominal wound is then closed, as has been my practice for many years, in layers by animal sutures and sealed with iodoform collodion without drainage. Hæmorrhage is sometimes troublesome because of ectasic ovarian veins. In such cases it is far better to inclose all the tissues upon either side of the uterus by a line of double continuous sutures taken quite deeply into the broad ligaments, including the uterine arteries. Carefully done, it limits hæmorrhage to the very considerable amount of venous blood remaining in the tumor. This is sometimes advantageously lessened by the compression of the growth with an elastic bandage before suturing. When the pedicle is comparatively long I often use a rubber dam, as the dentist surrounds a carious tooth, and constrict the base with an elastic ligature. When this is feasible, the peritoneal cavity is thereby cut off from contamination.

In the debate, one or two speakers had criticized such elaborate methods, saying: "It is the life of the patient which they are endeavoring to save rather than the carrying into effect of the so-called 'ideal surgery.'" I agree with them and yet contend that the life of the patient is the first and only object sought in ideal surgery and that for this reason such methods are both practical and ideal. Discussions like the present must necessarily fall far short of the whole truth, since only general principles and methods can be outlined, while surgical treatment must of necessity vary with each individual case. Nevertheless, the class of tumors under consideration is by far the most serious and troublesome of all the benign neoplasms within the range of abdominal surgery. It is presumed none present would deny that the opening of the vagina, necessitated by the removal of the entire cervix, adds in a measure to the danger involved. Peritoneal infection is thereby rendered possible, and, when convalescence has been safely effected, the vagina is not only foreshortened, a matter often of considerable importance, but the cervical attachments of the broad ligaments having been lost, both bladder and rectum are thereby deprived of an important support. That it is possible, in most

instances, to treat with safety, in an expeditious, neat manner, the pedicle as advised, is attested by the experience of quite a number of the gentlemen present; that it has many manifest advantages is conceded by all. The floor of the pelvis is left intact; it is roofed over by a well vitalized peritoneum which covers the inclosed stump; it is rendered safe from hæmorrhage, and on this account the abdominal cavity does not require drainage, since there are no broken or unclosed surfaces for serous or bloody oözing. The entire abdominal wound is closed and sealed from infection and there remains only the chief criticism which is urged against the adoption of such methods, to wit, the element of time. To this the words of one of the most famous of America's early surgeons are most applicable: "Well enough done, soon enough done." As a matter of fact, this intra yet extra-peritoneal treatment of the stump is not only the most effective security against hæmorrhage, but can be completed with a saving of time when compared with either the method of preparing a pedicle for fixation in the lower angle of the wound or by removing the entire cervical portion of the uterus with either abdominal or vaginal drainage.

The question of complication of other organs, as rectum, bladder or ureters, is a subject where dangers pertain in common to any of the various methods under advisement. Vaginal disinfection, curetting of the cervical structures, and tamponing of the vagina with iodoform gauze, are important preliminary steps in any of these serious operations and may be wisely done before etherization. Somewhat periodically a German woman upon whom I operated in 1880 by the method above outlined, visits me. She has remained in perfect health and her chief anxiety is expressed in her constantly recurring question, "Wen die Mutter wieder Wachset?"

In closing, I desire to pay a tribute to the memory of the late Dr. Minor, of Buffalo, N. Y., whose valuable contribution upon the relation of the peritoneal envelope of ovarian cystomata suggested to me the possibility of making a peritoneal covering for the cervical pedicle. I am free to predict that in the near future the method as outlined, variously modified to suit conditions, will be the rule and not the exception pertaining to uterine myomata, quite as much, and for as excellent reasons, as now guide the surgeon in the treatment of ovarian cystomata.

Dr. E. E. Montgomery, of Philadelphia, Pa., said:

I have been greatly interested in the papers read, Mr. Chairman, showing as they do the process of evolution in the progress of the operation of hysterectomy, by which we have been able to overcome the necessity of treating the stump externally, a course which has been the source of much trouble and worry to patient and operator alike. When it comes to a consideration of the question as to whether complete extirpation of the uterus should be done or a part of the cervix should be left as a stump, we must be governed by the individual case with which we have to deal. There are cases where one operation should be performed and others in which another procedure is indicated. In those cases where there is but a small stump, an operation may be done leaving it in place; and where the operation of Eastman, Baer, or Goffe, as you may choose to designate it, is indicated.

The method which I have pursued is to ligate the ovarian arteries on either side en masse, grasping the broad ligament with a large hæmostat near to the uterus, and cutting between the forceps and the ligature. Peritoneal flaps are then made anteriorly and posteriorly, the broad ligaments split, and the uterine arteries ligated. The remainder of the procedure will then consist in the removal of the entire organ, or by cutting through the cervix, leaving a small plug in the upper part of the vagina. Where the entire uterus is removed, the vagina is packed with gauze from above and the peritoneum is stitched over it. When I have done an amputation I cauterize the mucous membrane of the stump with a Paquelin cautery or with carbolic acid, and provide for drainage by passing a plug of gauze through the canal into the vagina. The peritoneum is sewn over the stump.

As to the operation recommended by Dr. Baldy in inflammatory cases, I believe

there are many patients suffering from puerperal sepsis in whom the removal of the uterus is clearly indicated, and that its retention will lead to prolonged convalescence, danger to the patient subsequently, and in some cases be the cause of death. I have, in some cases where the disease involved only one side of the pelvis, removed a portion of the uterine wall and stitched it up with catgut sutures.

Dr. L. S. McMurtry, of Louisville, Ky., being asked to give his views of the papers, said:

GENTLEMEN: I do not think that anyone could listen to this important subject this morning without being impressed by the great change which has taken place in public sentiment in late years. Three years ago it would have been impossible to have this discussion take place before such a large and representative gathering of men from all parts of the country without having trouble ensue. It was thought until recently that these tumors did no harm, that they would disappear at the menopause. This was the teaching for a long time and many a woman has gone to her death from fibroma of the uterus under a diagnosis of heart failure, etc. The profession has now come to accept the views of gynecologists who insisted that these growths are of very grave surgical importance. Another observation which must be patent to all is the influence exercised on American surgery by the different schools of surgery in the world. The operation of total extirpation of the uterus, for instance, is of German origin, having been first performed by Schroeder; but it has been modified by Dr. Marcy and others in this country. Another school was that founded by Keith, and Dr. Baldy is a disciple of this school, while Dr. Edebohls gets his ideas from still another. And this is an important fact to bear in mind, for if a man has received his training at one of these schools of surgery he will do better work in that line in which he has been trained than in any other. It is fatal to fix hard and fast rules for performing these operations. I have no doubt that Dr. Edebohls can do the operations which he describes with greater ease and satisfaction and in less time than Dr. Baldy could; and it is equally true that Dr. Baldy can operate by his own method much better than could Dr. Edebohls. We will get into trouble when we discuss the merits of different operations without due consideration of this fact. In performing these operations we should not start in with the full determination to do some particular operation, for we can not tell what difficulties and dangers we may meet. Operators might often change their plan during an operation very easily and profitably, but they start in with the determination to do some particular operation by some particular method and they will not make any deviation from it. I have never done the abdominal operation for small uterine myomata to which Dr. Edebohls alludes, for, as a general rule, I do not believe they should be dealt with surgically unless they are giving trouble. As we all know, these growths are very common in the African race, and very often do not give any trouble whatever. In cases where we feel certain that the patient can withstand a prolonged strain, I believe that the appendages should be removed. I did such an operation some time ago, and several years afterwards I had a chance to examine my patient again, and found her in good health and with the tumor much diminished in size. On the other hand I saw another case which had been operated on by Dr. Goerster, of New York, on whom I afterwards had to perform hysterectomy. In skilled hands the mortality of removal of the appendages is less than 2½ per cent, and I am surprised to hear Dr. Baldy allude to it in such a deprecatory way. What are the dangers of abdominal hysterectomy? To those who have mastered the technique of surgery it requires no effort to lay aside the question of sepsis. The great danger, then, is from hæmorrhage. First, there is the hæmorrhage before the operation—hæmorrhage caused by the tumor itself, and lowering the patient's health and vitality by the prolonged loss of blood. Second, hæmorrhage during the operation. I know of no operation in the entire range of surgery which seems as difficult as abdominal hysterectomy. It is the most difficult and most masterful operation a surgeon is called upon to perform. During the operation itself the

thought of hæmorrhage must be constantly in the surgeon's mind. Patients are often reported to have died from shock when, in reality, they have died from hæmorrhage. And, third, there is the danger of secondary hæmorrhage. The questions, therefore, to be considered are the dangers of hæmorrhage during and after the operation, and the selection of the method of operating must be determined by these two factors. To come to the operation itself, this may be very simple indeed. Take, for instance, those cases where the tumor can be mapped out and moved around; you make an opening and find no adhesions, and as, a rule, it is a simple hysterectomy. My method of procedure is to include the broad ligament, tubes, and ovaries in the clamp, divide the peritoneum fore and aft and strip it down. Then I arrange the pedicle so that it is not larger than my two fingers. This can always be done. Then the stump is fixed in the lower angle of the wound with the peritoneum thoroughly closed behind it. I have heard men speak of a sloughing stump as a powder magazine, but in this operation there is nothing left in the peritoneum at all; there is no cut nor scratch, nor anything like that. Whether you take Dr. Marcy's operation or Dr. Edebohls', you must consider that method which will furnish the largest field for safe operation. I have seen Dr. Edebohls operate, and I can testify that he can suture the peritoneum as it is very rarely done by other men. We will pass on to the consideration of those cases where the operation is more difficult. You open the abdomen and find the tumor up in the folds of the broad ligament, fixed and anchored in the pelvis and very difficult to move. The operation by the clamp method or by the serre-nœud can be done in the briefest space of time, generally in half an hour, and you have the best chances of getting good results. In the operation by the ligature you have more work to do, and you must leave the ligatures in the abdomen. But what is a good thing for some operators is bad for others. There are some classes of cases almost inoperable and when you know beforehand that the operation will be fatal you do not bring any credit upon surgery by attempting to perform hysterectomy. In the case of tumors not so large as those alluded to, but where there are adhesions, from the very moment that you open the abdomen you are right in the tumor with scarcely room to move your fingers about. My observation has been that with these uterine fibroids which grow to a large size the abdominal walls remain thick, but in ovarian tumors the abdominal walls are very thin. It is a nice question in these cases to decide what operation is to be done. There is one thing about Dr. Edebohls' operation that I have to criticise; and that is that the strong arrangement of the pelvic floor requires time, which is an element of danger to the patient. The operation described by Dr. Baldy has been done an injustice in the discussions this morning, because those who saw the operation in its early days remember a great big sloughing mass. You do not have any such picture presented to you as the operation is now done; there is nothing but a small dry stump, dusted with iodoform, which shrivels up and comes away in good time. I believe that in the operations done according to the methods described by Drs. Edebohls and Marcy, as well as in Keith's operation, as described by Dr. Baldy, drainage is necessary. I have been surprised at the amount of material removed through the drainage tube by my nurses, especially if a raw surface remains. As to the result of these operations, I have a patient, a lady 35 years of age, on whom I operated for a very large uterine fibroid six years ago. To-day she is in perfect health. She has no hernia, the cicatrix is small, she is active and well-formed, and a good wife and mother. No one would ever dream that she had had an operation performed, or that she was other than a normal woman, and although her uterus and tubes have been removed she retains all her womanly instincts.

Dr. Hannah T. Croasdale, of Philadelphia, Pa., said:

Mr. PRESIDENT: I have been called upon within the last year to operate for a myo-fibroma of the uterus about the size of an orange and being so small I supposed the hæmorrhage would cease after the removal of the ovaries, but the patient began

to menstruate freely again and lost much blood every month. My suggestions for a further operation have not been favorably received by this patient as yet, but I have no doubt but that after a time she will be perfectly willing to have her uterus removed. In another case the patient was a young girl not twenty years of age suffering from menorrhagia and metrorrhagia and an operation was performed for the removal of the appendages. Two months passed after the operation and then she began to bleed again. When the operation was performed the uterus was found studded with small fibroid growths about the size of the end of my finger and the ovaries were also diseased, in a state of cystic degeneration. I thought the operation would be a success as far as the bleeding was concerned; but about two months afterwards she began to bleed again. Her physician, writing to me, stated that it was like a post-partum hæmorrhage. She afterwards came back to me, and I decided that a supravaginal hysterectomy was in order. The cavity of the uterus contained no polypus nor fungous growth. This should be carefully noted before resorting to hysterectomy. Her recovery was rapid and uneventful and the patient is now well, rosy, and healthy. In my experience the result of removal of the appendages for myo-fibroma are not always good, so far as the cessation of the hæmorrhage is concerned.

Dr. Joseph Taber Johnson, of Washington, D. C., said:

Mr. CHAIRMAN: I have done the operation of removal of the appendages twenty-two times for the arrest of fibroid tumors and the arrest of hæmorrhage caused by them. All of the cases were perfectly successful except one where slight hæmorrhages continued after the removal of the ovary and tube on one side, and imperfect removal on the other side. In one or two cases there was a polypus within the uterus, after the removal of which the condition was perfect.

I would suggest that the chair call upon Dr. Gardiner, of Montreal, that the section may have the benefit of his experience.

Dr. Gardiner, of Montreal, Canada, in answer to the invitation of the Chair, said:

Mr. CHAIRMAN: I have done all the operations mentioned by the various speakers to-day, and have had a fair measure of success, but as far as further discussion of the question under debate is concerned, I can add nothing new to what has already been said. With reference to the last point of discussion, the removal of the appendages for the relief of hæmorrhage from fibroid of the uterus, I have had one or two failures in my operations. I have also done the operation recommended by Dr. Edebohls, and I think it a very satisfactory method. I believe in operating for small tumors. I think there is one thing, though, that we ought to do before removing the appendages for the relief of hæmorrhage. I believe it would be better for our patients to dilate the uterus first in order to see if the hæmorrhage be not due to a polypus, and then to curette the uterus before proceeding to do the more serious operations.

Dr. Edebohls, in closing the debate on his paper, said:

Mr. CHAIRMAN: This question has been so thoroughly gone over that there is very little to add, and I will not keep the section longer than is necessary to call attention to one or two points in the technique. The Chairman (Dr. McMurtry) seems to have received a wrong impression in regard to the size of the tumors for which I operate; he seems to think they were about the size of hazelnuts, whereas the smallest one I have removed weighed 3½ pounds. There is also one point in the technique which calls for special attention. Some operators think that they must cut the vaginal mucous membrane from below, circumcising the cervix, but this is not at all necessary; simply packing the vagina with gauze is enough, and then if a mistake in diagnosis has been made, the removal of the uterus proving not to be called for, there has not been so much harm done. Then, again, you may want to change your technique even after the operation is fairly under way. You should never undertake an operation and inflexibly insist on completing it in any one way,

whatever circumstances may arise. That is another reason why you should not cut into the vagina. Asepsis is altogether a matter of careful preparation and attention to details, and whenever we open the abdomen and are not sure we are going to do a total extirpation we should have the uterine cavity absolutely aseptic. The time spent in curettage of the uterus and cleaning the vagina thoroughly will be time well spent. Every operator has some little change of technique more or less his own, and I do not believe that every simple little modification should bear its proposer's name. Secondly, thorough distention of the vagina with gauze makes it very much easier to ligate the uterine arteries securely, a point for counterpressure being afforded by the gauze. Third, the uterine arteries should be ligated en masse. Fourth, a running Lembert suture of the peritoneum should close the opening left after the removal of the uterus. The time required for this operation is another element to be considered. Operators estimate their time by different methods. Some of my operations require an hour and a half, some one hour, for their performance, but that includes the time required to wash out the vagina, to pack the uterus, to pack the uterus and vagina, two changes of posture, and everything up to the completed closure of the abdominal wound. One of the cases recorded was one of multiple intra-ligamentous myo-fibromata. In this case there was no hæmorrhage; I simply shelled out the larger tumors first and then removed the uterus in the manner detailed in the paper. Another point which I have not insisted upon, but which is very important, is the simplicity of the instruments and the technique. No clamp is needed, and the instruments required are very few and simple.

Dr. Baldy, in closing the discussion, said:

I am willing, Mr. Chairman, to abide by anything I have said in my paper. I have spoken from an experience in all the methods of procedure, and not after an experience with only one method, as seems to be the case with the other speakers. To determine the relative merits of the two operations total extirpation and the supra-vaginal amputation, with the intra-pelvic treatment of the stump it is necessary to consider all the dangers incident to an hysterectomy. These are chiefly sepsis, hæmorrhage, and shock. In the total extirpation the additional element, shortening the vagina, must be taken seriously into consideration. This, everything being equal, is a very strong argument against total extirpation. As to shock, this is frequently dependent upon a prolonged etherization and an extensive manipulation. Can total extirpation be done as quickly as amputation with intra-pelvic treatment of the stump? The steps of the operation are the same in both cases up to the point of amputation. The time consumed in the extirpation is considerably longer. I did an operation several days ago, the period occupied from the time the knife touched the skin of the abdomen until I handed the tumor to the nurse, was just ten minutes. An attempt to make a complete extirpation would probably have doubled the time of operation. Even such a small increase of expenditure of time would probably have resulted fatally to the patient, as the pulse at the wrist was dropping every fourth beat when she went on the table. To have attempted to carry out the vaginal disinfection, as laid down by Dr. Edebohls, would have inevitably resulted in the death of the patient; and who would be willing to trust such disinfection to assistants or nurses to be done prior to etherization? As to sepsis, with the vaginal vault open and all the connective tissue in front of the bladder and in the broad ligaments exposed, who can deny that the chances of sepsis are infinitely greater than if the cervix be simply amputated? In the one case there is a large hole with an extensive exposure of raw surfaces; in the other case the only chance of sepsis is through the small cervical canal, the wounds in the tissues being of a minimum extent. The same line of reasoning may be used in regard to hæmorrhage. The amount of oozing from the extensive tearing of connective tissue is infinitely greater and more difficult to control than that from the small surface exposed in the amputation. The ligatures necessary in both operations are precisely similar, the difference in the operations being that in one case

a small piece of the cervix remains and in the other it is removed. Is there any reasonable objection to the presence of this small bit of cervix? None has ever been advanced and none can be conceived, provided, of course, malignancy be not present. Outside of the questions of sepsis, hæmorrhage, and shock, which are all against total extirpation, is there any objection to removing this bit of cervix? Its removal involves a vaginal shortening which is a decidedly serious matter, especially in married women. Every consideration is therefore against extirpation and in favor of amputation. The extra-peritoneal treatment of the stump with a wire clamp is a good and safe operation for those who have not had sufficient experience to perform the other operation. In the hands of a specialist we have probably heard the last of it.

Dr. Boldt then said:

Mr. CHAIRMAN: I wish to make one correction in regard to the use of gauze packing and drainage. We use no drainage in total extirpation of the uterus. The main feature of the operation is that no drainage is required; there is nothing to drain.

THE RESULTS OF VAGINAL HYSTERECTOMY.

By ANDREW J. McCOSH, M. D.,

Visiting Surgeon to Presbyterian Hospital, New York, Professor of Surgery in New York Polyclinic, etc.

An operation must be judged by its results. While in the last few years reports of a large number of cases of vaginal hysterectomy have been published, yet the results recorded have apparently not been sufficiently favorable to convince all surgeons that the operation is comparatively safe and satisfactory. For instance, it is claimed by some excellent gynecologists that in cancer of the uterus high amputation is attended by better results and of course with less danger, than is vaginal extirpation. There can be no question but that in many cases high amputation has been followed by most excellent results. I have recently seen two patients on whom this operation had been done, respectively seventeen and thirteen years ago, who have no sign of relapse. In both cases the operator was Dr. T. G. Thomas, and the diagnosis of carcinoma was confirmed by the microscope.

Vaginal hysterectomy, however, as a recognized surgical procedure, is of recent date, and, while a sufficient number of cases have been recorded for us to form a just estimate of its mortality and of the relative proportion of patients who are well two years after operation, yet we have records of only a comparatively small number of patients who have been followed for five years or longer. It is from this latter class of cases that our conclusions must be drawn as to the proportion of radical cures effected. The dangers of extirpation must, of course, always be greater than those of high amputation. I think it has already been shown that the results of extirpation are more favorable, as regards length of life after operation, than are those of the less radical operation and as time advances cases are accumulating in favor of hysterectomy and that in spite of the fact that this operation is done on many patients who would have been declared inoperable were high amputation the only surgical means at our disposal. It is important that all cases should be published, and especially those which have been watched for a number of years. The longer the list the more correct will be our conclusions. It is difficult to follow hospital cases for many years, yet if operators would take pains to hunt up all patients operated upon four years ago or longer and report on their condition a comparatively just estimate of the average number of radical cures could be reached. The mortality of the operation may be estimated at about 10 per cent. Winter reckons 8.4 per cent in 474 operations. Krukenberg reckons the mortality at 15 per cent in 243 cases operated on at the Berlin Frauenklinik.

The main object of this paper is to record the personal results of the author. No new methods are recommended, and no new instruments are presented. The operations are classed as (1) for cancer, (2) for prolapse.

FOR CANCER OF THE UTERUS.

All the cases of vaginal hysterectomy which the author has ever done are reported, and they cover a period from August, 1888, to September, 1893. Operations, 16; deaths, none. Fifteen of these patients have been followed. One has disappeared from view. Of the 15 who have been kept under observation, there are at the present time (August, 1893) in good health and perfectly free from malignant disease: Five years after operation, 1 patient; four years after operation, 2 patients; two years after operation, 3 patients; one and one-half years after operation, 4 patients; one year after operation, 6 patients; one-half year after operation, 8 patients; less than three months after operation, 12 patients. There have died from return of the cancer, at the end of thirty-three months, 1 patient; at the end of seven months, 1 patient. There are alive, but with return of the cancer, either locally or in other organs, three years after operation, 1 patient; one year after operation, 1 patient. We thus see that, out of the 16 patients operated on, 4 have had a return of the disease. Unfortunately this will not be the final ratio, for, with the exception of the patients who are in perfect health at the end of five and four years after operation, the cases have not been followed for a sufficiently long time to warrant any decided opinion as to their chances for cure. I will mention in this connection two other patients with carcinoma of the body of the uterus who where operated on by the combined vaginal and abdominal methods. One of these cases, on whom I operated more than four years ago (fifty months), had a uterus as large as at a three and a half months' pregnancy; she is at present in perfect health, with no sign of relapse. The other patient, operated on two and a half years ago, is also in good health, with no trace of malignant disease. Four years, at least, must elapse before we can even pretend to regard a patient as cured. Indeed, a number of relapses have been reported after the expiration of more than four years. I have recently seen a patient who at four and a half years after extirpation was apparently free from disease (the operator was Dr. T. G. Thomas). Six months later, however, cancer recurred in her pelvis, and she died in another half year. Still, such late relapses are uncommon, and if a patient is well at the end of four years we can feel comparatively safe in predicting that there will be no return of the original growth. I have extirpated the uterus for cancer by various methods twenty-one times. At the end of more than four years 3 of these patients and at the end of two years 5 are well and entirely free from return of the cancer as far as can be determined by a personal examination. At the end of one year 9 patients are apparently perfectly well. Where extirpation has been possible I have always chosen this operation in preference to any other. I consider that a case is unsuitable for vaginal hysterectomy if either the broad ligaments or bladder is infiltrated with cancer. If a uterus is more than double its normal size, I consider abdominal hysterectomy the safer operation.

Before reporting the history of the vaginal cases, I will briefly describe my method of operation. It is unwise, I think, to lay down any special plan which must be followed in every case. The details of the operation must constantly vary, both in the manner of their execution and in their sequence, according to the peculiarities of the case. My general plan, however, is as follows: The patient is placed in the lithotomy position, with the buttocks elevated on a hard pillow. The vagina, vulva, and neighboring parts are cleansed in the usual surgical manner, and rendered as nearly aseptic as possible. A Sims or a modified Simons speculum is used to draw down the posterior vaginal wall and perineum. If there is any cauliflower growth from the cervix it is scraped off by the spoon or sharp curette. Any ulcerated surface is cauterized with the Paquelin cautery. After a fresh scrubbing

with 1 to 1,000 bichloride solution the cervix, if any remains, or the edge of the vagina, is seized with volsellum forceps and the uterus dragged downward toward the vulvar orifice. The anterior vaginal wall, with the bladder, is then dissected by scissors from the cervix, the incision being made at least half an inch away from the edge of the cancer. The separation of the anterior wall of the uterus from the bladder and vagina, as far laterally as the broad ligaments, is then completed up to the peritoneum, which, as a rule, is not opened at this stage. The posterior vaginal wall is then separated and the peritoneal cavity freely opened in Douglas's pouch. A finger can now be passed in behind the broad ligaments, and with another in front they can be easily palpated and their exact condition determined. If the edge of the vagina bleeds, the hæmorrhage is controlled best by a running catgut suture. The lower part of each broad ligament (perhaps a fourth of the entire length) is then secured generally with a ligature and that part of the ligaments cut loose from the uterus. That organ will generally then be considerably freed, and can be pulled lower down. The next portion of each ligament is then secured and cut in a similar manner. Either before or after this the peritoneal cavity is freely opened over the anterior part of the fundus. This can generally be done by tearing with the finger, though sometimes the peritoneum is so tough that a sharp instrument is needed to make the opening. The upper portions of the ligaments are then secured and cut and the uterus is free. It is often easier, at the upper part of the ligaments, to tie (or clamp) on one side only, and cutting the uterus free on this side, drag the organ outside the vulva where the remaining side of the ligament can be secured. After the uterus has been removed careful inspection is made to ascertain if hæmorrhage has ceased. Occasionally a few bleeding points need a catgut ligature and sometimes the ligatures on the broad ligaments need to be reapplied. If the ovaries and Fallopian tubes appear healthy they are not disturbed unless they fall downward into the opening, in which case they are removed. If the adnexæ, however, are infiltrated with inflammatory or other material, the ovaries and tubes are removed and as much as possible of the ligaments. After a vaginal hysterectomy, in most of my cases, I have sutured the peritoneum to the cut edge of the vagina. This is done partly to stop the oozing of blood from the cut edge of the vagina and partly to cover up the raw bleeding surface which remains between the vagina and peritoneum. I think it is a good rule to follow, though in the few cases where this detail has been omitted no harm has resulted. In only a few cases have I closed the peritoneal cavity by sutures. There may be some advantage in this, but I have not found it to be necessary. The stumps of the broad ligaments are drawn gently downward and a roll of iodoform gauze is placed in the opening extending up to the peritoneum; but not inside the cavity. A pad of sterilized gauze is placed over the vulva and this is renewed as often as may be necessary. The iodoform gauze pad is removed on the fifth or sixth day and the vagina gently irrigated. The patients, as a rule, are out of bed by the fourteenth, often by the ninth day. The temperature has, in two or three of the patients, risen on the fourth or fifth day to 101°; but in the other cases it has never risen above 100°. As a rule, very little shock has followed the operation and but little pain is experienced. As stated before, this plan is often altered. Sometimes it is easier to begin the separation behind; sometimes better access can be gained to the broad ligaments by tipping the fundus forward or backward. Shall the broad ligaments be secured by clamps or ligatures? As a rule, I prefer ligatures. In most cases they can be applied without much difficulty. In certain cases, however, where the uterus can not be drawn freely downward or where it is necessary, on account of the patient's condition, to adopt the most rapid method, clamps are preferable. The use of clamps is followed, I think, by more pain and perhaps by necrosis of more tissue than is the case where ligatures are employed; but these disadvantages may be trivial when compared in certain cases with the greater safety and rapidity with which clamps can be adjusted. The ordinary clamp used

in abdominal work, with a long, curved, biting surface and short handles, is all that is needed. They are removed at the end of thirty-six or forty-eight hours. I think, however, that ligatures are to be preferred, and there must be very few cases where they can not be applied. I pass them threaded in a full curved, rather short but heavy needle, held in an ordinary needle holder. In most of my cases I have employed silk for ligation of the broad ligaments. I never feel quite secure after the ligation of considerable masses of tissue with catgut and always think that there is greater liability for the knot to loosen and for portions of the pedicle to draw out. It may be prejudice; but I am always better satisfied when the broad ligaments have been ligated with silk and, as more tissue can be embraced by the ligature, fewer are needed and time is thus saved. I have seen no great disadvantage in the use of silk. In a very few cases (3 out of 16) it has acted as a foreign body and, after the lapse of a few weeks, has produced a certain amount of vaginal discharge If left alone these ligatures would probably have come away of themselves, but it is a very simple matter to introduce a speculum, grasp the ligatures in a pair of forceps, and by a gentle pull they will slip off almost painlessly and the patient will be at once rid of this petty annoyance. As a rule, however, no inconvenience has been experienced from the use of silk.

It may be of interest to mention that the great majority (80 per cent) of these operations were done in the public operating room of a large general hospital and remained in the common ward with the usual variety of cases, septic and aseptic, which collect in a public hospital.

Case 1.—Married, multipara, age 49. Cancer of cervix extending to internal os. Operation in August, 1888. Cauliflower growth burned off by Paquelin cautery; broad ligaments secured by clamps (5). No suture of peritoneum. Patient sat up on fifteenth day; examined July, 1893; no trace of disease in the pelvis, and general condition excellent.

Case 2.—Married, multipara, age 53. Cancer of cervix, involving edge of vagina. Operation in cancer hospital, August, 1888. Broad ligaments secured by clamps (6). In September, 1891, return of cancer in apex of vagina. Death, June, 1892.

Case 3.—Married; multipara; age, 42. Cancer of fundus, involving entire uterine body down to internal os. Operation May, 1889, in Presbyterian Hospital. Broad ligaments secured by clamps. Patient sat up on twelfth day. Examined July, 1893. No return of disease, general health perfect; weight, 225 lbs.

Case 4.—Married; multipara; age, 39. Cancer of cervix. Operation July, 1890, in Presbyterian Hospital. Lower part of broad ligaments secured by ligatures, upper part by clamps. In November, 1892, return of disease. Alive in July, 1893.

Case 5.—Married; multipara; age, 43. Cancer of cervix. Operation April, 1891, in Presbyterian Hospital. Broad ligaments secured by clamps and ligatures. Patient sat up on fourteenth day. Has disappeared from observation, but was free from disease three months after operation.

Case 6.—Married; multipara; patient of Dr. N. C. Waker. Cancer of cervix and posterior wall of vagina, extending downward toward the vulva for 2½ inches. The entire thickness of the posterior vaginal wall was infiltrated with cancer, a roundish area, 2½ inches in diameter being involved. Operation October, 1891. The uterus was first removed, both ligatures and clamps being used. The entire posterior vaginal wall was then removed, from its upper end to a point just above the posterior commissure. It was more or less adherent to the rectum, and, at several points, the rectal wall was partly torn, leaving intact the mucous coat alone. A great part of this separation was done while one finger was in the rectum. The patient lost a considerable amount of blood. The operation lasted one and three quarter hours. The patient rallied well, however, and was out of bed by the twenty-first day. In July, 1893, the patient has no sign of return of the disease.

Case 7.—Married; multipara; age, 32. Cancer of the cervix. The vagina and broad ligaments were apparently free from disease. Operation June, 1889, in Presbyterian Hospital. Both ligatures and clamps were used. Patient had a rapid convalescence, but the disease returned in four months and the patient being desirous of another attempt at cure, celiotomy was done in October, 1891. A cancerous mass was removed from the cicatrix at the apex of the vagina, but the intestines were found infiltrated and the pelvic glands involved. No attempt at radical removal of the disease was made. The abdomen was closed and the patient made an uneventful recovery. She died four months later, in February, 1892.

Case 8.—Married; multipara; age, 47. Cancer of cervix. Operation July, 1891, in Presbyterian Hospital. Broad ligaments were tied with silk ligatures. Patient out of bed on twelfth day. Examined in July 1893 and there was no sign of return of the cancer. Condition good.

Case 9.—Married; multipara; age, 49. Cancer of cervix. Operation July, 1892, in Presbyterian Hospital. Ligatures. Examined July, 1893; no return of cancer; general health excellent.

Case 10.—Married; multipara; age, 51. Cancer of cervix. Operation in Presbyterian Hospital July, 1892. Ligatures and clamps. The left broad ligament was found to be infiltrated, and was in part removed. Patient had always been known as a "bleeder" and a great deal of oozing of blood followed the operation, which required a large number of ligatures and circumsuturing. Patient in July, 1893, is in a very low condition from cancer of the stomach and other abdominal viscera.

Case 11.—Married; multipara; age, 39. Cancer of cervix. Broad ligaments secured by ligatures. Operation June, 1892, in Presbyterian Hospital. Patient examined July, 1893. No sign of return of cancer; health good.

Case 12.—Married; multipara; age, 42. Cancer of cervix and of lower half of uterine body and edge of vagina. Operation March, 1893, in Presbyterian Hospital. Broad ligaments secured by ligatures. Sat up on tenth day. Examined August, 1893. No sign of return of cancer; patient has gained 20 pounds in weight.

Case 13.—Married; multipara; age, 43. Cancer of cervix and of lower part of fundus. Operation March, 1893, in Presbyterian Hospital. Broad ligaments secured by ligatures. Patient examined August, 1893; in perfect health; no sign of cancer.

Case 14.—Married; multipara; age, 39. Cancer of cervix. Operation in Presbyterian Hospital, August, 1893. Broad ligaments secured by ligatures of catgut. Patient out of bed on eleventh day.

Case 15.—Married; multipara; age, 42. Cancer of cervix. Operation in Presbyterian Hospital, August, 1893. Broad ligaments secured by silk ligatures. Patient out of bed on twelfth day.

Case 16.—Married; multipara; age, 39. Cancer of cervix and edge of vagina. Operation in Presbyterian Hospital, August, 1893. Broad ligaments secured by silk ligatures. A cylinder of vagina an inch deep removed from the upper end and the peritoneum sutured to the cut edge. Patient out of bed on eleventh day.

The above record comprises all my cases of vaginal extirpation for cancer. In certain other cases I have started the operation with the hope that the entire uterus could be extirpated; but have been forced, on account of the involvement of bladder or broad ligaments, to limit myself to high amputation. While there are a certain number of these cases suitable for abdominal hysterectomy, I have never seen one which, in my opinion, was suitable for sacral hysterectomy. There may be exceptional cases, but my experience with the operation has led me to the conviction that when a uterus can not be removed by the vagina or abdomen, it is better to refrain from any radical operation. By sacral operations I mean any of the methods by which the uterus is removed through the back, whether by sacral resection or perineal incisions. The same argument does not apply to cancer of the uterus and of the rectum. In excision of the latter organ, even if the disease is not eradicated, the danger of intestinal obstruction will probably be removed. In cancer of the uterus, no such danger threatens the patient.

FOR PROLAPSE OF UTERUS AND VAGINA.

In ordinary cases of prolapse of the uterus, even where complete, the plastic operations usually adopted in such cases (perineorrhaphy and colporrhaphy) are, as a rule, adequate to effect a cure. In such patients more serious operations, as vaginal hysterectomy or abdominal hysterorrhaphy, are unjustifiable. There are certain cases, however, of complete prolapse of uterus and vagina, which the minor plastic procedures are utterly inadequate to cure. Such cases are found among working women, where a large uterus and an enormously hypertrophied vagina hang constantly outside the vulva and have so hung for many years; the bladder has been dragged completely outside, the rectum has been pulled downward so as to be almost doubled on itself, and the pouches behind and in front of the uterus are filled with intestines which slip upward and downward, according to the position of the patient. In such patients, the vagina has apparently been the main factor in the pro-

lapse, for it is very much lengthened, widened, and its muscular and cellular tissue enormously increased, the wall being often an inch in thickness. The prolapsed mass may be as large as the adult head and sometimes is irreducible. Perhaps among private patients, who can and will take good care of themselves, the combination of perineorrhaphy, colporrhaphy, and Alexander's operation, with the wearing of a pessary afterwards, may nearly always render such patients comfortable. In working women, however, who neglect themselves, and are obliged to lift and carry heavy burdens, such operations are, in my experience, almost invariably attended by failure. When the patient leaves the hospital a brillant cure has apparently been effected and, at the end of three months, the cure may still persist but in another three months or in a year, the condition of these unfortunate women is generally as bad as before operation. I know that this is a strong statement and is directly opposed to the statements of some of our prominent gynecologists, men for whose opinion I have the greatest respect; but I simply state my own conviction and one which has been partly formed from observation of patients who have been operated on by these same surgeons, who maintain that the plastic procedures suffice in every case. If the plastic operations on vagina and perineum will not cure such patients, to what other procedures can we resort? Will vaginal hysterectomy be sufficient, or is abdominal hysterorrhaphy the more satisfactory operation? I consider that either one is justifiable in such conditions. In my experience, vaginal hysterectomy alone is not sufficient to effect a lasting cure. When reënforced by a perineorrhaphy and a colporrhaphy, it may give satisfactory results in most cases; but extirpation alone, without the aid of the minor procedures, has, in my experience, been followed by failure in nearly all cases.

Six patients, whose uteri have been extirpated for the cure of aggravated prolapse, have come under my observation. Four of them have been operated on by myself, the other two by able surgeons of this city. In three out of the six, the hysterectomy has been reënforced by a perineorrhaphy or colporrhaphy. One patient alone has been satisfied by the result obtained. In this case, I removed the entire posterior vaginal wall and built up the perineum. In two patients the result may be classed as a partial success; in one of these hysterectomy alone was done, in the other a perineorrhaphy was added (both cases were operated on by the author). In three cases the result has been a failure, and the patients are but little better off than they were before operation. In each patient, at the end of a year, a large mass protruded from the vulva of the size and character of the original tumor, only minus the uterus. In one of them (operation by the author), hysterectomy alone had been done; in another, perineorrhaphy, and in the third, lateral colporrhaphy had been added. In the last-mentioned case, at the end of eight months the woman's condition was so wretched that she begged for further operative relief and, in response to her appeal, I opened the abdomen (patient in Trendelenburg's posture) and with considerable difficulty drew the cicatrized apex of the vagina up into the abdominal wound and in that situation carefully sutured it to the peritoneum and recti muscles, covering it over with the external oblique muscle and skin. At the end of six months the result was highly gratifying; the vagina was still somewhat roomy, but there was no sign of cystocele, rectocele, or protrusion outside the vulva. The patient was comfortable and happy. The result in this patient has been so satisfactory that I have persuaded one of the other cases of failure to undergo the same operation.

A short record of four cases operated on by myself follows:

Case 1.—Married; multipara; age, 42. Prolapse had existed for twelve years. Perineorrhaphy and presumably colporrhaphy had been done on her four years previously in one of our city hospitals. The prolapsed mass had been irreducible for six months. It was the size of the crown of an ordinary Derby hat, extending outside of vulva to a length of twelve inches; circumference nineteen inches. Reduction impossible even after two weeks rest in bed with ice bags, etc. Operation July, 1891. Uterus extirpated, posterior vaginal wall reduced in size and a perineorrhaphy added. This patient died a few months after the operation from

kidney and heart disease. This may be classed as a partial success though, had she lived longer, it would have been classed, I think, as a failure.

Case 2.—Multipara; age, 38. Prolapse which had existed for ten years, about the same size as in case 1, but reducible. Uterus extirpated in July, 1891, and almost the whole of the posterior vaginal wall removed (weight of vaginal tissue ten ounces). This left a large triangular gap, the edges of which were united, and a high perineum was formed to partially close the outlet. This patient, at the end of two years, has still a very voluminous vagina, but there is no prolapse and I consider the result satisfactory.

Case 3.—Multipara; age, 39. Prolapse for fourteen years, the size of a large cocoanut. Operation August, 1892, in Presbyterian Hospital. Uterus extirpated. In six months the patient was as uncomfortable as before operation and the case may be classed as a complete failure.

Case 4.—Multipara; age, 41. Prolapse for nine years, as large as in case 1. Patient had on two previous occasions submitted to operations for cure of her trouble. Uterus extirpated in March, 1893. At the end of five months the prolapse has partially returned, and doubtless will have fully returned in another three months. So convinced is the patient of this that, in October, she means to reënter the hospital for an abdominal elytrorraphy.

Of the two patients operated on by other surgeons, both are dissatisfied with the result of the original operation, but refuse further operative interference on account of the unsatisfactory results following their first attempt.

The details of the operation do not essentially differ from those of hysterectomy for cancer, except that the whole procedure is performed outside the vulva. The operation, however, is somewhat tedious and is attended by considerable loss of blood. When the uterus is removed an enormous raw surface remains consisting of the inner surface of the vagina. This surface continues to bleed persistently and the blood vessels seem to have very little contractile power. In spite of numerous ligatures, the oozing persists even after pressure by clamps, sponges, gauze, etc. has been exerted for some time. I do not refer now to the broad ligaments which, of course, have been tied in the usual manner and cause no trouble; but to the free capillary and venous hæmorrhage from the spongy surface of the vagina out of which the uterus has been dissected. I have found that an attempt to stop this by means of ligatures was endless and that the best means for its control was a continuous catgut suture. A comparatively small area of vagina is dissected off the uterus by scissors, and a needle threaded with fine catgut is carried out and in just under this bleeding surface and a complete circumsuture of the area is made. Then a further dissection and another line of suture and so an until the uterus is free. In one of my patients, even by this method, I could not completely stop the hæmorrhage and I was compelled, after wasting considerable time, to fold the vagina inward on itself, bringing one bleeding surface against the other, and there suture them together around the entire circumference. On account of this tendency to bleed the operation is somewhat tedious and should not be practised on weak patients.

It may be that a larger experience may modify my views, but at present it is my judgment that vaginal hysterectomy for the cure of aggravated prolapse is an unsatisfactory procedure and that, as a rule, in such cases abdominal hysterorrhaphy (hysteropexy) is the preferable operation.

CAVERNOUS ANGIOMA OF THE UTERUS, WITH SPECIMEN, AND REMARKS ON THE METHOD OF DOING VAGINAL HYSTERECTOMY.

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The angiomata in other portions of the body are quite common and the theories as to their origin vary as much as do the varieties of angiomata. In the uterus the existence of this neoplasm has, however, hitherto not been described to my knowledge; I have therefore taken the liberty to present the specimen.

The patient from whom it was obtained is 37 years old and a nullipara. For nearly a year she had been bleeding more or less, the hæmorrhages during the last four months being more profuse and the intervals shorter. A number of curettings with a sharp instrument with short intermissions had only a temporary effect on the metrorrhagia. The endometrium showed nothing malignant; only a hyperplastic endometritis could be diagnosed with the microscope. The bleeding finally became so profuse about the time of the "should-be menstruation," that I, in view of the previous failures to cure with the curette and local applications, resolved to do something radical, especially as the patient was becoming very anemic and right-eously discouraged. Vaginal hysterectomy was decided upon, rather than castration, because of the probability that the chances of cure for the patient were certain if the operation was recovered from; and second, although no malignancy could be shown as yet, it seemed rather suspicious for the bleeding to recur so persistently shortly after curetting.

After proper preparation of the patient, the operation was done by the method which I have described as ideal on a former occasion.* Owing, however, to the variance of opinions expressed again recently, by different writers, as to the proper method to employ, I feel called upon to again say a few words on the subject. No fixed rule can be put down, but each case must be managed according to the circumstances presenting themselves. We will take an ordinary case, such as our instance. It is immaterial whether it be malignant or nonmalignant disease for which the operation is done, as far as the one feature is concerned, namely, the closing the wound completely and to have the broad ligament stumps entirely extraperitoneal. The portio is grasped with a volsella and the uterus pulled down as much as possible, when a transverse incision is made anteriorly through the vaginal mucosa, and the bladder stripped off the cervix; if it can not be completely done yet, only so much is separated as is convenient. The same course is pursued posteriorly, and the cul-de-sac of Douglas is opened. The peritoneum is now attached to the vaginal mucosa by a continuous catgut suture. The bases of the parametria are next ligated and cut on either side; it will now be found an easy matter to detach the still remaining part of the bladder from the cervix, when the peritoneum is attached to the vaginal mucosa anteriorly, the same as was done posteriorly. The broad ligaments are now ligated in sections and cut as we proceed, taking care that the needle enters the vaginal mucosa and, taking in its bite as much of the broad ligament as is desired, is then made to emerge again in the vaginal mucosa. Another stitch is taken in the texture already surrounded by the ligature, which prevents the possibility of the main ligature slipping off the respective stump. The ligature is now tied and the ligated portion cut through. We next proceed likewise with the other side, and so on until we have nearly reached the summit, when we also bring down the adnexa, if possible, and place our last ligature. It is obvious that by following this technique of introducing sutures our stumps are practically already secured in the vagina. It is also shown that delivery of the uterine body anteriorly or posteriorly is not resorted to. The organ having being removed, the terminal ends are grasped with bullet forceps, and an assistant makes sufficient traction to bring them completely into the vagina, when another suture is passed on the same principle as the previous sutures, enveloping all the stumps; this done on either side, the center gap can now be closed completely after removing the sponge or gauze tampon from the pelvic cavity, if one has been inserted to prevent the intestines from prolapsing during operation. Full curved, sharp needles of suitable size are used and nothing but catgut for ligatures. Silk delays the convalescence very much, and it can not be made more aseptic than the animal ligature, which latter can be tied just as securely and is not absorbed too soon. The needle holder is also preferable without a catch.

* See Vaginal hysterectomy for cancer of the uterus, American Journal of Obstetrics, October, 1892.

There is no necessity of drainage in ordinary cases, so that the practice of putting in a strip of gauze for this purpose in every instance had better be abandoned. I personally always feel safest when everything has been closed. Of course, if extensive adhesions are present, it is safer to put in a piece of gauze and drain for a few hours. In malignant disease the operation must be done as far away as possible from the diseased structure and sufficient vagina must also be resected if the portio is the seat of the neoplasm. *Clamps should never be used if ligatures are applicable.* The operation should be done with the patient in the lithotomy position, and not in the side posture as is advocated by some.

After removal of the particular specimen under consideration it was halved anteriorly, when a tumor was found, the size and shape of a medium-sized English walnut, located in the anterior upper corner of the organ reaching to the fundus. The tumor was bulging toward the uterine cavity and there appeared lobulated, of a dark mahogany-red color, and of a consistence somewhat firmer than that of the surrounding uterine walls; it extended, especially in its posterior portion, a little more than half the thickness of the uterine wall. Its transverse section appeared mottled, exhibiting a large number of dark purplish spots together with whitish spots, both of which varied in diameter from the transverse section of the quill of a raven's feather down to the smallest pinhead. To the touch the purplish spots appeared soft, corresponding to the consistence of recently coagulated blood; whereas the consistence of the whitish spots was very firm, almost approaching that of cartilage. Still more conspicuous was the difference in the color of the circular spots in their transverse section through the tumor, where the dark purple or blood-colored saccular fields were distinctly marked from the whitish fields alluded to. (See fig. 1). With low powers of the microscope the most striking feature was an abundance of large cavities, greatly varying in size and shape, filled with blood. Obviously these were transverse sections of large veins separated from one another by intervening fibrous connective tissue, in which a considerable number of capillary blood vessels could be seen. The amount of blood was by no means uniformly distributed throughout the veins, some of which showed a clot of blood consisting mainly of red blood corpuscles and comparatively little fibrin; other cavities, on the contrary, held a good deal of fibrin and serum, but not many red blood corpuscles. This peculiar fact may be accounted for by the circumstance that the flow of blood was not uniformly accessible to all constituent veins of the tumor, a number of veins being partially or completely obliterated and consequently causing an obstacle to the circulation of the blood even within the permeable portions. Since, with high powers of the microscope, the endothelial wall of the permeable cavities could be seen without difficulty, the nature of the tumor must be defined as that of a cavernous angioma. (See fig. 2). Around a number of transverse sections of the cavernous veins peculiarly glistening veins could be seen occupying either small portions of the wall or ensheathing more or less of the periphery. These veins prove to be the incipient signs of obliteration. The capillaries of the interstitial connective tissue were found to vary greatly in size and mostly empty. Around some capillaries, however, likewise narrow, light veins could be seen closely resembling those at the borders of the venous cavities; and, as the capillaries surrounded by such veins were of a very narrow caliber, the inference could be drawn that these capillaries were likewise in the process of obliteration. Similar features were found around the scanty, tortuous arteries present at the border of the tumor toward the muscle wall of the uterus. The image of such arteries is that described by pathologists as waxy degeneration of the arteries. The interstitial connective tissue holds, in different though not extensive places, a dark yellow-brown pigment, which probably are the outcome of previous extravasations of blood. In other portions there are larger masses of pigment clusters, which, from the configuration of the fields holding such pigment, must be considered as the last residues of obliterated cavernous veins. The large venous cavities penetrate into the muscle wall of the uterus, as already

stated in the naked-eye appearance. The tortuous arteries and the enlarged capillaries are most numerous at the periphery of the tumor. There is no distinct boundary line between the most peripheral cavernous veins and the adjacent muscle tissue, which latter directly borders the venous cavities. Small, light patches in the interstitial connective tissue admit of no other explanation but that of being completely obliterated arteries or capillaries.

Considerable interest attaches to the obliteration of the cavernous veins throughout the tumor. Whether or not the involution of the veins was due to the repeated scraping and subsequent application of carbolic acid I am unable to say with positiveness, but presumably this is the case. A number of the obliterated veins appear of such peculiar shape that the idea forces itself upon one's mind that the venous cavities must have been in a collapsed condition at the time when obliteration began. Another possibility is that some parts of the tumor were deprived of blood by a preceding obliteration of a certain number of venous cavities which likewise may have resulted in the locking up of the blood current and collapse of the veins thereupon. (See fig. 3).

All veins, either in the process of obliteration or thoroughly obliterated, are marked by hyaline or waxy rims around the previous walls. Such rims are occasionally found doubled or even trebled; in the latter instance a narrow rim of medullary tissue can be traced between the waxy layers. The central portions are occupied either by myxomatous or by fibrous connective tissue and, in the latter instance, the fibrous tissue is often found in hyaline or waxy degeneration. Occasionally a portion of the caliber of the vein remains permeable to blood, whereas a large amount of the previous caliber has disappeared, being transformed into one of the named tissues. Again, these tissues are often found intermixed with medullary tissue, which in our specimen is conspicuous by a marked stain with ammoniacal carmine while the waxy portions take no carmine or very little of it. Another feature is the varying breadth of the waxy rim, which at one periphery may be broad, occupying almost the whole previous caliber of the blood vessel, whereas the opposite periphery is occupied only by a narrow rim. The waxy rim is not always continuous around a previous vessel, since small portions may be lacking and are replaced by delicate fibrous connective tissue blending with that in the interior of the obliterated vein. The last outcome of the tissue changes is apparently a more or less circular spot, altogether made up of fibrous connective tissue holding either clusters of pigment or small, tortuous, obviously newly formed capillary blood vessels.

In order to comprehend the process of obliteration we may resort to somewhat higher powers of the microscope (see fig. 4). Here we notice a convoluted hyaline rim, closely reminding one of the residue of a Graafian follicle after its rupture in the process of ovulation. In the latter instance the possibility suggested itself that the light convoluted rim filled with myxomatous tissue might be the remnant of the elastic or basement membrane after encircling the Graafian follicle as the boundary zone between the epithelium and the vascularized theca folliculi, which is nothing but fibrous connective tissue. No such possibility can be thought of in the veins. Here we might resort to the hypothesis that the albuminous portion of the blood became soaked into the wall of the vein rendering it homogeneous and glossy. The wall is never structureless, but invariably shows delicate striations and interspersed protoplasmic bodies. In our instance the caliber of the previous vein is in a measure still preserved and permeable to blood. The greater amount, however, is solidified and transformed into a myxomatous and myxofibrous connective tissue. The latter is unquestionably the outcome of a proliferation of the endothelial wall of the vein, much in the same manner in which arteries are rendered solid in the process of endarteritis obliterans, by an outgrowth of the endothelium, the so-called intima of the artery. Around the partially obliterated vein we see myxofibrous tissue, obviously the outcome of an inflammatory process accompanying or preceding the

obliteration of the vein. Then follows the smooth muscle wall of the uterus in which we observe, in the interstitial connective tissue, clusters of medullary or inflammatory corpuscles, either the outcome of inflammation or the indication of the first step toward new formation of cavernous angioma, leading to an extension of the tumor from its periphery. There are good reasons for upholding the latter view, especially because of the presence of hematoblasts or undeveloped red blood corpuscles within the medullary nests. To-day it is fully admitted that Rokitansky's assertion, made fifty years ago, that the formation of red blood corpuscles precedes the formation of cavernous angioma, is correct.

How peculiar the outcome of obliteration of a cavernous vein may be is shown in fig. 5. Here the convolutions of the waxy rim are so pronounced that the idea almost forces itself upon one's mind that the vein must have been collapsed and empty before the process of obliteration had started. The convoluted rim here is but faintly striated and carries a limited number of branching protoplasmic or fibrous tracts. This means a high grade of waxy infiltration. Between the convolutions we notice tracts of medullary tissue intermixed with fibrous connective tissue. The supply of this tissue with capillary blood vessels is small. The whole formation is surrounded by a zone of medullary tissue directly bordering upon unchanged smooth muscle tissue. In the left upper corner we notice a waxy patch, evidently an obliterated capillary or artery. What the waxy rim is can be determined only with higher powers of the microscope (see fig. 6). Here we see protoplasmic tracts traversing the glossy basis substance in different directions, being in connection with the medullary tissue occupying the central portions of the obliterated vein and with a more fibrous connective tissue surrounding the outer periphery of the waxy rim. The protoplasmic tracts are conspicuous by a large number of nuclei and an abundance of coarse granules of living matter. No regularity prevails either with regard to the size or the shape of the protoplasmic formations, although they remind us of pathologic cartilaginous tumors, the so-called chondromata, which occasionally are likewise found traversed by irregularly branching protoplasmic tracts. From a histologic standpoint I, indeed, would not hesitate in comparing the waxy rims of the cavernous veins with an anomalous formation of cartilaginous tissue in certain chondromata. The basis substance is in both instances not devoid of structure, but traversed by an exceedingly delicate reticulum of living matter; discernible with a power of six hundred diameters, in the shape of branching tracts of minute granules. I have dwelt upon the histologic minutiæ of this case somewhat at length for two reasons; first, because no case of cavernous angioma of the uterus is as yet on record, so that my case may justly be considered unique. Such tumors are of rare occurrence, most frequently found in the stroma of the liver, in the derma, or in the mucous membranes. They are either stationary or spreading, though slowly, and, although of a benign type, they may be accompanied by excruciating pain. The first to accurately study cavernous angioma was Rokitansky, who, as stated before, maintained that a new formation of red blood corpuscles accompanied, or even precedes, the formation of the tumor. This assertion was contradicted, some forty years ago, by Virchow, but it is to-day generally admitted to be correct. The second point of great biologic interest in my case lies in the process of involution of the cavernous veins. From the facts described I have but little doubt that the tumor was slowly progressive, though partially, at least, healing up by the obliteration of a number of veins. In consequence of the almost constant bleeding, extirpation of the organ was a perfectly legitimate procedure. If, however, the correct diagnosis could have been made (which was an impossibility), another course of treatment would probably have given us a satisfactory result; namely, the application of the actual cautery to the tumor after dilatation of the cervix.

Another deduction may be made from this case; that it was not the curetting which gave the temporary relief so much as the local use of pure carbolic acid. On

the contrary, the bleeding was always quite profuse when the curette was used. This would correspond, too, with the lesion.

Dr. Boldt, after reading his paper, added:

Mr. PRESIDENT: The question of a cure after an operation depends upon the disease. If the operation be done for cancer, and if the disease does not return in a year or a year and a half, we may pronounce the case cured, but we have patients dying six months after an operation and it is called a return of the disease. I do not believe, however, that it is a return; but that the disease was not thoroughly eradicated. The fact that the broad ligaments may be involved by infiltration does not argue that such infiltration is of a malignant character; it may be due to perimetritis. If the infiltration is of a malignant nature, there is a hardness about it differing very materially from the resiliency of the infiltration of an inflammatory character, though this does not indicate that the infiltration will make the operation easy; that will depend entirely on the yielding of the uterus. The ligature is to be preferred to the clamp in nearly every instance, although there are a few cases where clamps are necessary. I wish to condemn the use of silk *in toto;* we have no use for it whatever. It is not necessary to say that we should begin anteriorly or posteriorly in our operations; that point each case must decide for us. As we go on with our ligatures the broad ligaments are reached, and these should be ligated in sections. Catgut is the best material to use for ligatures and there is no danger of its slipping if properly applied. I have done the operation over fifty times with no bad results. I discard silk entirely. After removing the uterus the roof of the vagina is securely closed. There is no necessity for drainage when the operation is completed in this way and catgut is used.

The way to prevent the ligature from slipping it to superimpose the ligatures and draw them tight before tying. The stumps (already secured in the vagina) are grasped by bullet forceps, and an assistant pulls on the ends of the stumps while the operator takes another sweep all around the stumps on either side; the vagina is then closed completely. When you operate on a patient in this way, that patient is going to die very soon or she is going to get well. When a patient is treated by this method there is no danger of secondary complications and the surgeon can go home secure with the knowledge that there is going to be no hæmorrhage. The woman will remain in bed but a few days (about ten days on an average); but my rule is to have the patient sit up on the third or fourth day. Some surgeons say that we must use drainage because the pad is wet with serum in those cases where it is used, but that is not a sufficient indication for the use of drainage.

To recapitulate: The vagina should invariably be closed; in suitable cases the stump of the broad ligaments are to be treated extra-peritoneally, and use only catgut in every case. No silk is to be used.

VAGINAL HYSTERECTOMY.

By E. E. MONTGOMERY, M. D.,

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The removal of the uterus through the vagina for malignant disease was the subject of earnest discussion in the International Congress held in this city in 1887. It had its earnest advocates and its equally determined opponents. Its probably large mortality was condemned, its efficacy questioned. To-day it is one of the accepted operations of surgery. Without question there are now but few who would prefer, in any case, to temporize by partial measures, such as amputation of the cervix, high or low, when we can remove the entire organ in which the disease has had its nidus, with as slight a mortality as attends the excision of the uterus.

Arguments in advocacy of the greater safety by the removal of a portion of the organ avail nothing if it can be shown that the entire organ can be excised with a very small mortality. It must be apparent to the most prejudiced mind that there is more hope for the future escape of the patient through extirpation than in the removal of the cervix. In some of my own cases there was disease of both body and cervix, apparently independent of each other. The amputation of the cervix could have been made in healthy tissue, and still have left more marked disease in the cavity of the uterus, which would have been accepted as a relapse, had the latter procedure been chosen.

Indications.—In selecting suitable cases for this operation there should be no question as to its advisability whenever the disease is limited to the uterus, whether cervix, canal, or body be the seat of its development. As has been frequently recognized, the disease progresses to a greater degree in the mucous membrane in which it originates and it is difficult, from microscopical appearances, to determine when it has passed beyond the line at which the amputation can be conveniently made.

That the disease is confined to the uterus is determined by the mobility of the organ upon vaginal and rectal examination, the absence of any extension of the disease upon the anterior or posterior walls of the vagina, and failure to discover by rectal touch the presence of infiltrate or nodular projections in the posterior surfaces of the broad ligaments. Not every case of fixation of the uterus or apparent peritoneal infiltration should be considered a contra-indication to operation, as it may have been caused by previous inflammation rather than by malignant disease. The history will often afford us light as to its true character, for in malignant infiltration the smooth surface is absent and supplanted by nodules or tubercles; the mucous surfaces of vagina and rectum over the infected parts are fixed, immovable, and indurated. In inflammatory attacks the mucous membrane may be displaced and stretched, but is never infiltrated. The excision of the uterus need not be confined to malignant disease. It has been in late years practiced and warmly advocated by many French operators in inflammatory diseases of the pelvis, to supplement the removal of the appendages. The wisdom of such a procedure is still *sub judice*. It may be well advocated in some forms of small fibroid, where free and persistent hæmorrhage is the rule; also in prolapse of the uterus of marked degree, with ulceration of the neck, where amputation must result in cicatricial contraction and in acquired stenosis of the cervix, or where the greater part of the canal has become occluded through injuries of parturition. The operation is contra-indicated wherever the disease has extended beyond the limits of the uterus, involving structures that can not be safely or effectually removed, whether upon the vagina, through the broad ligaments, or into the lymphatic glands of the pelvis. It is sometimes exceedingly difficult to determine when the line has been reached beyond which it is unwise to operate. A patient came under my observation in September, 1892, whose cervix was destroyed flush with, or even above, the level of the vagina, and in removing the organ an apparently diseased lymphatic as large as a hickory nut was enucleated from one side of the uterus. But little hope was entertained of immunity from a relapse, but she is now, nine months later, in better health than she has had for many years, with apparently no indication of a return of the disease. When the uterus is movable, and the broad ligaments are not infiltrated to such a degree as to render them incapable of withstanding the pressure of a ligature or a clamp, it would seem wise to select the operation of extirpation. The specialist, unfortunately, finds the progress of the disease so marked when the patient first comes under observation that the period for a hopeful operation has passed, and he is confronted with a condition for which but little more than palliation can be expected. This delay is often occasioned by disinclination upon the part of the patient to submit to physical examination. She acts upon the counsel of her elder female acquaintances, who assure her that her symptoms are premonitory to the

coming change of life and the woman patiently bears her loss from blood and watery discharge until it becomes painfully evident that the promised change will be a translation to another sphere. Less frequently than formerly, yet too often, her medical adviser, without even the semblance of an examination, prescribes ergot or an astringent and assures her that the menopause will make all right.

It should be remembered that while the period of the climacteric and later years predispose to the development of malignant disease, it is by no means limited to it, but has been found in women as young as 20. In the 21 cases upon which this paper is based, 5, all with undoubted epithelioma of the cervix, were under 40 years of age. The symptoms which should lead the physician to suspec serious disease, and which should lead him to demand a physical examination as the price of his continued attendance, are hæmorrhage, pain, and a thin, watery discharge—hæmorrhage in the form of an increased flow at the menstrual periods or excited in the intervals by exercise, straining, or coition. In women in whom the menopause has occurred it may be in the form of a slight flow occurring occasionally, which leads her to believe that the menses are returning; or there may be a smart hæmorrhage, and nothing more occurs for several months, when another takes place. Hæmorrhage or irregular bleeding is generally the first symptom, though it may be preceded by either pain or leucorrhœa—more frequently the latter. This discharge is thin, having the consistence of water, and emits an exceedingly offensive odor similar to that of decaying or putrid flesh. It may be quite free or slight in character. While generally a turbid or milky fluid, it may frequently be stained with blood. Pain is intermittent, more frequently occurring in the afterpart of the day and at night. It may radiate from the uterus into the sacrum and down the limbs, or be recognized as an intense grinding pain in the uterus or the sacrum. As the disease progresses the pain becomes more intense and persistent, until it is absolutely unendurable unless modified by anodynes. While pain is the symptom most dreaded, it is the one most frequently absent. Patients not infrequently go to the last stages of the disease without any suffering, and it is sometimes difficult to convince physician and patient of the gravity of the condition, on account of its absence. The existense of any of these symptoms should awaken the physician to the importance of a careful examination. No patient should be permitted to go unadvised of the possible gravity of her state when she declines an examination. The disease will usually be found affecting one or other lip of the cervical canal. Where extensive, it results in marked infiltration, cauliflower growths, or ulceration. There should be no difficulty in arriving at a diagnosis. If in doubt a section may be removed and subjected to microscopic investigation. If the cervix presents no indication of disease, and careful examination of the pelvis fails to reveal any cause for the symptoms, the uterine canal should be dilated, and the cavity explored with the curette or finger. In malignant disease there will generally be found a mass of broken-down tissue situated upon a more or less indurated base. The examination, unless carefully done, will be provocative of severe hæmorrhage.

Preparation.—When the operation has been decided upon it is advisable to delay it as short a time as is consistent with a proper preparation. The suspected character of the disease and the dread of the operation are urgent reasons against unnecessary delay. The patient should be put to bed, given a free purgative, subjected to antiseptic vaginal douches, and, several days before the operation, the vagina should be carefully cleansed with a solution of creolin and tincture of green soap, then the diseased tissue carefully cut away with sharp curette and scissors, the cavity and vagina irrigated with a hot sublimate douche, 1:2000, dried, and packed with iodoform gauze. Later this packing should be removed, the vagina cleansed and repacked. The latter packing may remain until the time of operation, when it should be removed and the cavity and external surfaces carefully cleansed with the creolin and soap solution, and finally irrigated with hot sterilized water. The external surfaces should have been previously shaved.

Operation.—The patient is anesthetized, placed in the lithotomy position upon a suitable table, and the uterus exposed by an Edebohls speculum or laterally by retractors. It is seized preferably with a three or four pronged volsella, as the latter will afford opportunity to catch more tissue and give a more secure grasp than can be exercised with the more common two-pronged instrument. The uterus is drawn down, and with the knife the vaginal mucous membrane is cut through, encircling the cervix as far away from the affected tissues as is consistent with the safety of the ureters and the bladder. The tissues are pushed off from the anterior surface until the vesico-uterine fold of the peritoneum is reached, and, posteriorly, also, to the peritoneum. Laterally the tissues are pushed back. The more thoroughly this is done the less likely will the ureters be injured or compressed. The surfaces are irrigated with hot water, dried, and the peritoneum opened in the retro-uterine pouch. A sponge with a tape or string attached is passed into the cavity to keep the intestines back and prevent their being soiled. The anterior peritoneal fold is opened; the finger introduced behind the uterus and carried over the left broad ligament as a guide; the female blade of the modified Greig Smith clamp is carried upward, and, by depressing the external end, the upper is made to appear above the ligament. The other blade is projected into this from in front of the ligament, and the clamp locked and firmly screwed down. The ligament is divided between the clamp and the uterus. If the uterus is large and a little difficult to get around, it may be delivered and the other clamp applied externally, exercising the precaution to make sure before locking it that its upper extremity can be returned to the pelvis without impinging against the bladder. After it is firmly secured the uterus is cut away and the sponge withdrawn. The clamps are held to either side and the cavity irrigated. Any spurting vessels may be secured with hæmostats, though this is generally unnecessary. By drawing first upon one clamp and then upon the other, some iodoform gauze is carried above the end of each, and the vagina between them lightly packed. This packing is made with one strip of gauze. The gauze thus applied, while serving as an excellent means of drainage, prevents the contact of loops of intestine with the ends of the clamps, and prevents the former from making unfortunate adhesions. The patient is placed in bed and the usual means exercised to prevent or overcome shock. The shock is sometimes profound, even when the operation is of short duration, probably due to the crushing of the nerves of the broad ligament by the clamp. The great advantages of the clamp over the ligature are: (1) Its ease of application, enabling the operator to economize valuable time; (2) the greater security against hæmorrhage; the ligature, though apparently securely tied, may slip from the stump when the latter shrinks after removal of the uterus; (3) we have no infected ligature to complicate or delay the subsequent convalescence; (4) by the traction upon the clamps we are enabled to carry the gauze above the lacerated surfaces and pen the intestines within the peritoneal-lined cavity, thus affording ready exit for any sloughing tissue devitalized by the pressure of the instruments. The clamps are removed at the end of twenty-four hours, while the gauze tampon is permitted to remain for three or four days longer, unless some indications present for its earlier removal. After the withdrawal of the gauze a douche of sulphurous acid 1:20 is used two or three times in the twenty-four hours. The catheter is used while the gauze remains; afterwards the patient may be permitted to void her urine. She may be permitted to have an extra pillow at the end of a week, a bed rest in ten days, and allowed to sit up in two weeks. The convalescence is generally uninterrupted, and much less likely to be influenced by septic processes than in abdominal operations.

Accidents.—The most likely complications of the operation are injuries of the bladder or the ureters and hæmorrhage. Where the disease has extended up on the vagina or when the cervix is completely destroyed it is exceedingly difficult, in our efforts to keep well outside the limits of the disease, to avoid opening the bladder or cutting a ureter. In my second operation I introduced a uterine sound into the

bladder to determine its lower margin, and placed it in the hands of an assistant. As I proceeded with the dissection I was much alarmed and disgusted to see the point projecting into the vagina. When attention was directed to it the assistant withdrew it and the opening could not be discovered. The accident had no influence upon the result, as the patient recovered without an unfavorable symptom. In my twentieth patient the cervix was entirely destroyed. In encircling the diseased surface I felt very fearful that I would open the bladder, so was not surprised to find that later urine was passing by the vagina. Three weeks after the operation a careful examination was made, but the point from which the urine escaped could not be recognized; the bladder was injected with milk, but none of it escaped into the vagina, rendering it evident that the bladder was uninjured. The quantity of urine escaping through the vagina steadily diminished, while there was no change in the quantity voided through the urethra. I presume this patient had received an injury of one side of a ureter, forming a uretero-vaginal fistula and this opening contracted, causing the entire urine to pass into the bladder.

Hæmorrhage may occur from the cutting of anomalous arteries or from the slipping of the ligature from the lateral ligament. In one patient, as the operation was completed, some movement was made with one clamp which had not been accurately adjusted and it slipped off, permitting free bleeding. The bleeding vessels were secured by clamps by drawing down one portion of the ligament after another until the entire cut surface was secured. The accident seemed to have no influence upon the result.

Results.—The value of any procedure must be decided upon its merits. In the consideration of this operation we have two important questions to decide: (1) Is the operation one especially dangerous to life? (2) Does it afford sufficient hope of cure to justify the physician in recommending it, and the patient in submitting to the discomfort and danger? In the discussion of these questions I do not propose to do more than to analyze the twenty-one cases upon which this paper is based. I am quite well aware that in doing so I am subjecting myself to criticism upon the small number of cases; but a procedure that will permit of twenty recoveries out of twenty-one operations certainly can not be considered a very dangerous one. The fatal case was the third operation, and took place upon the fourteenth day from tetanus. A mortality of less than 5 per cent compares very favorably with the work in the abdomen and pelvis often done for conditions of much less gravity.

As to the second question, the patient is suffering from a condition for which, so far, medical skill has provided no adequate remedy other than the knife. Returning to our notes, we find that in sixteen of the twenty-one cases some form of cancer was absolutely demonstrated by the macroscopical and microscopical appearances of the affected tissues of these cases. Eleven are still living, two are suffering, one of whom underwent operation seven months since, the other four months. Nine patients are in good health, one of whom has survived within one month of five years, one nearly four years, one over three, and the remainder for periods varying from four months to nearly two years. The patients who have died generally showed symptoms of relapse within two months after the operation, and death took place in from three to twelve months.

We feel that these statements are sufficient to demonstrate the expediency of the procedure. The remaining five cases were operated upon for fibroid growths which were causing profuse hæmorrhage and a lowered vitality. One of this series has since been reported to have died of cancer of the mammary gland. The other four are in good health.

The CHAIRMAN: These papers on vaginal hysterectomy, together with that portion of Dr. Baldy's paper which treats of this subject, are now before the section for discussion. The Chair will ask Dr. Howard A. Kelly, of Baltimore, Md., to open the discussion.

DISCUSSION.

Dr. Kelly said:

Mr. Chairman and Gentlemen: It gives me especial pleasure to discuss this paper as it only serves again to call attention prominently to the fact that the gynecologists of to-day are all pursuing methods practically alike and the differences are but those of detail. This is the condition of the specialty rapidly approaching its completion. There is an important relation we hold to these cancer cases, upon which I have been insisting in my lectures at the Johns Hopkins Hospital for the past four years and which I would like to see widely recognized; that is, the adoption of means of securing cancer patients at an earlier period in their history. To this end I would insist—

First. That all women who have borne children should return to the office of the physician who has attended them in their confinement, within six months after the delivery, for an exact inventory of the condition of the pelvic organs, when the physician must state in a written record the lesions and the extent of the lesions which have been produced by the confinement.

Second. Cervical lacerations should be carefully described, noting the position and depth of the tear and the appearance of the lips. These call for no treatment when the lips are thin, uninfiltrated, or lie together. Thick infiltrated lips, associated with cervical catarrh, call for depletory treatment followed by repair of the laceration.

Third. Every living woman who has passed 35 years of age and has borne a child should have this examination made without delay by a competent physician, and if the lips do not appear perfectly sound, she should be kept under observation at intervals of from six to eight months.

Fourth. Every woman with a cervical tear over 35 should be examined at least once a year for ten years, or longer, if the appearance is not perfectly healthy.

Fifth. This applies with redoubled force to patients whose family history shows a marked inclination to cancerous diseases.

If these rules are conscientiously observed there is not a shadow of doubt but that thousands of lives would be saved yearly in this country alone by a timely interference with a disease so markedly local and accessible in its origin. I feel that, while we are hunting for a cure for cancer, the line of progress for the immediate future for us gynecologists is clearly in the direction of prophylaxis and anticipation, either in preventing or in discovering the malady in its earliest stages. It will readily be seen from this that I believe that the vast majority of cancerous uteri develop upon infiltrated and lacerated cervices.

The operation of total vaginal hysterectomy is now one of the safest and one of the most satisfactory in the list of major gynecologic procedures and the mortality in favorable cases should be almost nil. I do not think we ought to be too careful in admitting cases for operation, for sometimes when the cervix is large and infiltrated, and the mobility of the uterus somewhat limited, provided there is no thickening of a broad ligament, the enucleation is followed by a complete recovery without recurrence of the disease. I thus treated a patient two years ago, where I thought the chances where all in favor of a speedy return of the disease. The microscope showed an extensive carcinoma of the cervix extending up into the uterus. Here there was decided limitation of the normal movements of the uterus. I examined the patient a short time ago, and she remains free from a recurrence of the disease.

My own method of operating is briefly this: After curetting away the manifest disease and cleansing the vagina thoroughly, stout ligatures are passed through both lips of the cervix, three or four in number, and tied tightly, thus closing the uterus and preventing the escape of any of its septic contents over the wound during the operation. The cervix is then ringed with a knife, cutting through the

vagina and freeing the cervix from the vault. Both broad ligaments are now tied off below, using two or three stout silk ligatures, each time cutting between the ligature and the cervix until the uterine arteries are tied. The operation is then continued all the way up one broad ligament until it is entirely severed from the uterus, which is now delivered through the vaginal vault and brought entirely outside the vulva. At this stage of the operation the patient presents a peculiar appearance with the uterus presenting by one of its sides lying between the labia. It is now an easy matter to ligate the other broad ligament from above downward, if necessary, giving the disease a wider berth.

Dr. Charles P. Noble, of Philadelphia, Pa., said:

Mr. CHAIRMAN: I shall confine my remarks to the subject of hysterectomy for prolapse. I am not an advocate of the operation for this condition. I believe those cases are extremely rare where it is necessary to do this operation in order to cure a patient. I believe we can cure our patients by other operations not so serious, although I admit that there are some few cases where it is justifiable. We sometimes find a class of patients with complete prolapse which has existed for a very long time, where Douglas' pouch is deepened until it comes down to the anus. Not only that, but the posterior wall of the vagina is so extremely thin—there being only about one-eighth of an inch of tissue—that it is not possible to restore the floor of the pelvis. This class of cases it is impossible to cure by plastic work, but it is the only class in which I would consider it justifiable to do vaginal hysterectomy for prolapse. Of course we may do it if the patient has had cancer, but in that case the operation would be for the cancer and not for the prolapse. I think we can cure all other cases without taking out the uterus. If the women are young (say within 30 years) it is better to cure them while leaving the uterus and ovaries in than by removing these organs.

My method of operating is not original. An inch or an inch and a half of the cervix is cut off; the mucous membrane of the vagina is sewed to the cervix, making its mucous membrane continuous with that of the cervix; then I do a Stoltz operation on the anterior wall if there is a cystocele; then the pelvic floor is restored by Emmet's operation. In all the cases on which I have operated, perhaps thirty, I have yet to see a case where the uterus has come down. I have recently operated on two cases in which I did not expect to get a cure and in these cases the prolapse will probably recur. In a woman with reasonably thin abdominal walls the addition of ventral fixation to the plastic work will probably give the best results. In that way we can obviate the necessity for doing hysterectomy. Even when we do perform hysterectomy we have to do a plastic operation afterwards anyway and I think we can do it all with better advantage at one sitting. In doing a vaginal hysterectomy I always make it a practice to stitch the broad ligaments to the vagina and use them as guy ropes; but these guys will stretch in time if the pelvic floor is not restored.

Dr. George M. Edebohls, of New York, said:

Mr. CHAIRMAN: I shall enter only on one phase of the subject, viz, vaginal hysterectomy for complete prolapse of the uterus and vagina. This is never necessary except in one of two conditions; first, where the condition of the uterus is such that a neoplasm is suspected; and secondly, where the uterus itself, both cervix and body, is so large that it is impossible to reduce it to approximately its normal size by amputation of the cervix. These are the only conditions which warrant total extirpation for prolapse. In my judgment, it is possible to cure all our patients without resorting to so serious an operation, either by doing ventral fixation of the uterus alone or by combining it with the needed plastic operation, doing all necessary operations at one sitting. Every case of prolapse of the uterus, except the two classes mentioned, can be cured by combining plastic operations with ventral fixation. I have had three cases of total extirpation for prolapse, but removal of the uterus alone is not sufficient to cure the condition; I had to narrow the vagina and close the perineum

at the same sitting. Ventral fixation of the uterus is a much less dangerous operation than hysterectomy. It is just as easy to do in fat women as in lean ones and there is no danger of hernia if a buried permanent suture be used to unite the peritoneum, muscle, and fascia to each other. No woman should have her uterus removed for simple prolapse; modern surgery gives her the right to expect a cure without the removal of any essential organs.

Dr. Andrew F. Currier, of New York, said:

It is very interesting, Mr. President, to consider the gradual processes in the evolution of an operation, to watch the gradual change of mind which has taken place in the profession in regard to great subjects like the one under consideration. This was also true of the subject under discussion yesterday, ectopic gestation. These subjects, when first attacked, are attacked in a conservative way. We prefer to do a simple operation as a first step, but by a gradual evolution we arrive at a condition when we think that these cases should be treated by a radical operation; they should be treated by a method which will entirely remove the diseased condition. So, I think, we are approaching a logical conclusion in regard to these cases by concluding that there is, for all cases which are susceptible of radical treatment, but one operation for cancer of the uterus, and that is complete removal. With regard to the question which has been discussed in connection with this subject, viz, removal of the uterus for prolapse, I shall not dwell upon, because the points raised by some of the other speakers (Dr. Noble and Dr. Edebohls) coincide entirely with my own views on the subject. With regard to the removal of the uterus for cancer, however, there are several points which have not yet been touched upon by any of the previous speakers, but which, I think, are very important. First, in cases in which extirpation by the vagina has been decided upon, if the disease is on the surface and is very extensive, the best plan is to curette out the uterus preliminary to the operation for removal. Allow a week or two to elapse and then finish the operation. In this way the chances of infection are reduced to a minimum. As to the technique, each individual experience must govern us in these cases; each one must be operated on according to the conditions met with in each case.

Another point not alluded to, but which I expected Dr. Kelly to mention, is that concerning the danger of ligation of the ureters. Every one should familiarize himself with catheterization of the ureters to prevent such an accident. This accident has happened to me and I speak feelingly on the subject. I know of no means which will obviate this danger so well as the use of the catheter. In hysterectomy for cancer, having closed the peritoneum and left the vagina open and seen the patient put to bed, should we consider our work done; should we leave the case entirely at that point? It is through the neglect of operators that the disease recurs. Dr. Kelly has expressed my feelings on this subject and has emphasized the fact that after the child-bearing age there should be frequent examinations. But when the organ has been entirely removed for cancer what should we do to prevent a recurrence? It is like fighting fire. Eternal vigilance is the price of safety and only by this eternal vigilance, which is essential to the woman who has had cancer, can we hope to prevent its return. These women should be examined frequently, at least every one or two months, and at the slightest appearance of a return they should be operated upon immediately. In the use of the actual cautery we have a means which should be employed in these cases. Dr. Byrne, of Brooklyn, has had remarkable success in the use of the actual cautery. We should remove the cancer with the knife, and, at the first reappearance of the disease, use the cautery. We may, in this way, save many lives.

Dr. J. M. Baldy, of Philadelphia, Pa., said:

Mr. Chairman: I shall confine my remarks entirely to the question of hysterectomy for prolapse. Comparing the two operations, by the clamp or ligature, I have found by personal experience that the clamp operation is much harder and more dangerous than the use of the ligature. Two out of the three deaths which have

followed my operations for vaginal hysterectomy have been due to the use of clamps. In my first operation with clamps some of the tissue escaped from the end of the clamps on one side and the patient died from hæmorrhage. In my second operation of the same character, I made use of Montgomery's clamps; but in spite of that fact and in spite of all my precautions to include all the tissue, the second patient was lost from the same cause. I have never experienced any such difficulty with ligatures as with the clamps.

On the question of hysterectomy for prolapse I am at variance with most of the gentlemen who have spoken. In my paper I stated that those women who are near or past the menopause are proper subjects for hysterectomy and I should have no hesitation in doing hysterectomy for prolapse on such patients. I do not advocate the operation, however, in young women who can still have children. Dr. Edebohls is undoubtedly correct when he says that there must be something besides plastic operations in certain cases, in spite of the remarkable certainty of cure claimed by some of the gentlemen. I adopt hysterectomy instead of hysterorrhaphy. We have heard Dr. Boldt's remarks in regard to the small mortality of hysterectomy; Dr. Kelly says that the mortality should be almost nil; we have heard Dr. Montgomery's expressions in regard to the same point; the same has been my experience, as well as that of most other operators. In hysterorrhaphy we take all the risks of hysterectomy and, moreover, we leave behind a large mass which may undergo cancerous degeneration and which, by its weight alone, may reproduce the condition of prolapse. The question is, can you get some support for the vagina above after the uterus has been removed. If Dr. McCosh continues to do hysterectomy as he describes, of course he will fail. We must give some support to the vaginal vault. Bringing down the stumps of the broad ligaments into the vault of the vagina and stitching them to the vaginal walls they act as guy ropes and with certainty hold the vaginal vault well up in the pelvis. It is well to do a plastic operation afterwards, as this does away with the drag upon the tissues above. There is no disadvantage in doing a plastic operation later; we may wait two, three, or four weeks; the patient is in bed and can wait. The condition of the vagina at the time of the second operation shows a more extensive drawing up of the vaginal vault than when the patient was put on the operating table the first time and the hysterectomy done. In my mind it is simply a question of mortality between vaginal hysterectomy and hysterorrhaphy; the hysterectomy can be done as safely as the hysterorrhaphy if done by a competent operator.

Dr. Andrew J. McCosh, of New York, said, in closing the debate on his paper:

Mr. CHAIRMAN: The question of the relative merits of silk and catgut enters into every branch of surgery and there are as many advocates of the one as of the other. I find, however, that most of the men who have tried both are coming back to the use of silk. If heavy silk is used in tying the broad ligaments trouble will ensue, but if fine silk be used no danger need be apprehended. In three out of twenty cases in which I have done vaginal hysterectomy I had to remove the silk stitches, but it was done in my office without pain and I considered their extraction a mere trifle. My experience in twenty cases in which silk was used certainly showed that there was no danger to life in the use of silk. Moreover, it is easy to make silk perfectly clean. Catgut can be made sterile, but is more difficult to do so. Dr. Montgomery says that a week before he operates for vaginal hysterectomy he cleans out and curettes the uterus. I do not think this is necessary, as it can be done just as well at the time of the operation. Dr. Kelly said in his remarks that it was easier to cut off one side and then ligate and cut off the other side. In some cases this may be a good procedure, but I believe that it is attended by a greater loss of blood than the other method. One of the previous speakers stigmatized the use of iodoform gauze packing as unsurgical and stated that it was used in no other branch of surgery for packing cavities. I maintain, however, that it is valued very highly and is resorted to very frequently by surgeons in amputations, in packing joints, in

goitre operations, etc. The attempt to draw up the vagina by stitching it to the broad ligaments must, as a rule, result in failure. The ligaments are absolutely unavailable as supports in prolapse, as they have been drawn down and stretched by the weight of the hypertrophied uterus. I do not believe that after vaginal hysterectomy for prolapse that recurrence of the trouble can be prevented by suturing the vagina to the broad ligaments. These same ligaments have already become stretched and have allowed the uterus to be dragged down by the hypertrophied vagina and I can not see how these weakened ligaments can regain their tone and pull up the heavy vagina. In cases where the vagina is not enormously thickened they may do so; but such cases are not suitable for radical operations, as the ordinary plastic procedures are, as a rule, sufficient to effect a cure. In one of the cases of failure which I have reported this method had been adopted, but without benefit.

Dr. E. E. Montgomery, of Philadelphia, Pa., said, in closing the discussion:

Mr. PRESIDENT AND GENTLEMEN: I fully agree with Dr. Noble and Dr. Edebohls in regard to the infrequency with which the operation of hysterectomy should be done for prolapse of the uterus. I have myself never done the operation for that purpose; I simply mentioned it in my paper as a possible indication. In regard to the use of the clamp and the ligature, the majority of my operations have been done with the clamp. Dr. Baldy's objection to the clamp forceps is a good one, and I agree with him as to the likelihood of the ends of the instrument springing, permitting the tissues enclosing the ovarian artery to escape from their grasp. With Dr. Montgomery's modification of the Greig-Smith clamp, however, no such escape can take place and there is no possibility of bleeding. The clamp can be removed in twenty-four hours; indeed, I have no doubt it could be removed without danger after twelve hours, as the tissues are so crushed that bleeding would be impossible. The advantage of the clamp over the ligature is the greater rapidity with which the operation can be performed. I have done the operation by the use of clamps in ten minutes, while I do not believe I could accomplish it and ligate the broad ligaments inside of thirty minutes.

Dr. H. J. Boldt, of New York, said, in closing the discussion:

Mr. CHAIRMAN: Dr. Montgomery has contradicted himself in his own paper in regard to hæmorrhage. Dr. Baldy has called attention to an unquestionable danger. That at the proximal ends of the broad ligament there is danger of the tissue slipping from the clamp and of hæmorrhage occurring in consequence, I am firmly convinced. With the ligature operation there is no danger of secondary hæmorrhage. In reply to Dr. Kelly's remarks I would say that if you liberate one side of the uterus and pull down the uterus there is danger of the top of the broad ligament on the other side tearing and bleeding. In ordinary cases, I repeat, there is no use for drainage if we close everything in a surgical way.

Dr. Montgomery (replying to Dr. Boldt) said:

In regard to hæmorrhage from the use of the clamp I would say, Mr. President, that I had one case in which the blades slipped apart; it was the only case in which hæmorrhage occurred and was then due to carelessness. The broad ligament, however, was gathered up and the patient recovered.

THE PRESENT STATUS OF OUR KNOWLEDGE OF THE PATHOLOGY OF PELVIC INFLAMMATION, WITH SPECIAL REFERENCE TO THE TREATMENT OF PELVIC ABSCESS.

By RICHARD B. MAURY, M. D., Memphis, Tenn.

We are in a position to-day to entertain clearer views than ever before of the pathology of the pelvic inflammations and upon these views must be based the treatment of pelvic abscesses. I do not propose to present here a complete history of the subject; but merely to touch upon the salient features of diseases which

for so long have been the subject of controversy. My aim is to state concisely what appear to be well-established facts.

Pelvic cellulitis.—The history of pelvic cellulitis is one of the most remarkable in the annals of medicine. Dominating pelvic pathology from the time of Churchill and Marchal until the recent development of pelvic surgery, it was considered by the foremost men in medicine to be responsible for nearly all of the inflammatory exudations in the pelvis. In proof of this allow me to quote in brief from two of the most influential and respected authors of our age. Emmet wrote ten years ago:

"My convictions are, that while the primary cause of uterine disease lies, through the influence of the sympathetic system, in impaired nutrition, we must look to pathologic changes in the connective tissue as the immediate cause of the results we now regard as the original disease in the uterus and ovaries. I have never seen a case of ovaritis without inflammation of the neighboring tissues and where I have had the opportunity of observing early enough I have always detected the cellulitis before the ovary became involved. We have no means of judging with accuracy as to the condition of the Fallopian tubes during life; but unless they have been directly poisoned by some foreign irritation, as by gonorrheal discharges, the probabilities are that inflammation of their mucous membrane, as of that of the uterine canal, is secondary to some previous lesion in the cellular tissue."*

Thomas about the same time, while accepting the teachings of Bernutz in regard to pelvic peritonitis, wrote thus upon the pathology of pelvic abscess:

There are three sources of pelvic abscess: (1) The breaking down of tubercular material deposited in the tissues of the pelvis; (2) suppurative action taking place in the walls of a cavity formed by a hæmatocele or ovarian cyst; (3) inflammatory suppuration in the areolar tissue, the ovaries, the tubes, the pelvic peritoneum, or the parenchyma of the uterus itself. Of all these sources the third is decidedly the most frequently met with and is most generally the result of cellulitis occurring after parturition or in the nonpuerperal state.†

Surgical treatment in every country has been based upon this doctrine. To-day, after the lapse of ten years, these teachings do not appear to represent the truth and it may be that they do not now express the opinions of the writers. That such views were then held it is perhaps not strange when we remember that the enucleation of pelvic pus sacs is of very recent date; that at the time Mr. Tait's work on the ovaries was written (1882) ovarian abscess was regarded as a condition of extreme rarity and that about the same period the gynecologic surgeons of London were under the impression that the pyosalpinx cases all went to the Birmingham market. But these doctrines are still being taught to-day.

Pelvic cellulitis is now recognized as one of the features of an acute septic inflammation which invades the sexual organs during the puerperium, and which may occur also as a sequel to surgical operations upon the genital canal. The inflammation of the cellular tissue does not here represent a separate and distinct morbid condition; it is associated with inflammation of the other pelvic structures, the lymphatics, the veins, the mucous and serous coverings of the uterus. The clinical condition thus described is a general pelvic inflammation. The question has often been raised and much discussed, whether cellulitis ever exists pure and simple, unassociated with pelvic peritonitis. Practically speaking, we would answer, No! To decide the question absolutely will require more accuracy in autopsic evidence than has been forthcoming during the past thirty years. Cellulitis to the extent of forming distinct pelvic exudations appreciable at the bedside is of infrequent occurrence, even in the puerperal woman. Outside of the puerperal state it may be said that practically we know nothing of it, now that the operation for the deligation of polypus and the use of sponge tents have been abandoned. Improved knowledge of pathology, better acquaintance with the exudations incident to pelvic peritonitis, and the frequent resort to abdominal section have proven the comparative rarity of pelvic cellulitis to the extent of causing noticeable exudations. This statement is true even when applied to cases of most pronounced septic character.

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* Principles and Practice of Gynecology, 1884.

† "Diseases of Women," 1880.

In many grave cases of puerperal fever I have been unable to discover lesions due to cellulitis. I have done five life-saving operations on puerperal women in whom the lesions were tubal and peritoneal and not cellulitic, so far as could be discovered before operation or after opening the abdomen. Others have had a similar experience. Coe's observations upon the surgical cases which terminated fatally by septic infection are generally known:

Of half a dozen fatal cases of hystero-trachelorrhaphy and incision of the cervix in which I have enjoyed the rare opportunity of studying the sequences, in every instance the cause of death was acute diffuse peritonitis. In none of these cases was there any evidence of acute cellulitis, although old cicatrices were not wanting.*

In the case of a woman from whom a fibrous polypus had been removed by deligation, McClintock found at the autopsy "intense recent peritonitis." This woman lived fifteen days after the operation of deligation and there was found, in addition to the fatal peritonitis, an abscess of one broad ligament. The great majority of exudations in the cellular tissue undergo resolution. This is true also of very large exudations. Abscess formation is the exception, even in large inflammatory masses. For this statement we have the high authority of Winckel and of Veit in pre-antiseptic times and in more modern times of Lusk and E. Ziegler.

When suppuration does ensue the pus collections, which may require surgical interference, will be found: (1) Between the layers of the broad ligament; (2) in the iliac fossa; (3) in the anterior abdominal wall between the navel and pubes; (4) possibly in the tissue behind the cervix. Phlegmon of the broad ligament, the most important of these collections, is usually associated with a recent labor, but it has repeatedly followed operations upon the uterus. It is remarkable how much obscurity and doubt surround, even now, the subject of broad-ligament abscess. There has been the greatest lack of scientific accuracy in the post-mortem reports. Courty† says "abscess of the broad ligament is common." W. H. Byford‡ thought that "the most frequent locality of pelvic abscess is between the layers of the broad ligament." Matthews Duncan§ says "post-mortem examinations have rarely shown the broad ligaments distended with pus." Thomas Savage,‖ recording the forms and localities of twenty cases of pelvic abscess, mentions but two of the broad ligament. One of these followed deligation of a polypus; the other was associated with a uterine fibroid and, I venture to suggest, was a tubal rather than a broad-ligament abscess. Berry Hart¶ uses this remarkable language:

There is little doubt that we can have a cellulitis of the broad ligament, and that it may go on to form an abscess of the broad ligament. This I have seen in an abdominal section by Prof. Simpson, where the existence of pus distending the broad ligament was verified by the aspirator passed in from above.

No doubt many observers have mistaken ovarian and tubal abscesses for suppurating phlegmons of the broad ligament. The differentiation can not usually be made by passing the aspirator. The tube must be separated from the mass. Careful dissection will be required. During the past year Polk has reported the single case of broad-ligament abscess from cellulitis which he has seen in his entire experience as an abdominal surgeon:** The report is to be commended for its scientific accuracy.

The woman was in the secondary stage of syphilis, had been confined five weeks prior to the operation and had been suffering from puerperal fever of moderate severity. There were discovered before operation masses on each side of the uterus, that on the right being the larger. On opening the abdomen the ovaries and fimbriated ends of both tubes were found free from any displacement; both fimbriæ

* New York Medical Journal, May 15, 1886.

† Mann's American System of Gynecology, Vol. I, p. 723.

‡ Mann's American System of Gynecology, Vol. I, p. 723.

§ Parametritis and perimetritis.

‖ Anatomy of Female Pelvic Organs.

¶ Manual of Gynecology.

** New York Journal of Gynecology and Obstetrics, April, 1893.

were open. A mass of exudation lay between the layers of the right broad ligament, bounded above by Fallopian tube and round ligament, within by the right wall of the uterus, below and to the outside by a line corresponding to the base of the broad ligament. From before backward this mass was 1 inch in thickness. On the left side a similar but smaller mass was found. The masses were dissected from their position and removed. Each ovary and tube was also removed. Examination of the tubes showed a slight catarrhal salpingitis with thickening of tube walls. Cutting into the mass, an abscess was found having no connection with tube or ovary. There was a slight thickening of the ovaries from serious infiltration.

Joseph Price states that in over 1,400 abdominal sections he has not observed an exudation from cellulitis once.* In view of these facts I would emphasize the statement that suppuration of the cellular tissue of the pelvis is rare as compared with the other forms of pelvic abscess.

Chronic cellulitis.—Cellulitis has been defined as an acute inflammation. Chronic cellulitis, as a discoverable clinical condition, does not rest upon a foundation of exact knowledge. The "parametritis posterior" of Schultze can not be accepted as a correct definition of the morbid condition to which it is applied. Schröder's opinion was that the shortening of the utero-sacral ligaments was due to a peritonitis. Hart says it should more properly be regarded as a combined peritonitis and cellulitis. Pozzi considers the lesion to be a perisalpingitis about the diseased adnexa. Bandl's† extensive and careful dissections show that "in the anteflexion cases residues of inflammation were found in the parametric tissue, in the muscular tissue of the folds of Douglas, and in the connective tissue and peritoneum surrounding them." According to Coe‡ "the thickening of the utero-sacral ligaments, so frequently alluded to in works on gynecology, has, when carefully dissected out, proved in my experience to be due not so much to a disease of the connective tissues of these ligaments as to a cicatricial condition of the peritoneum covering them." The propriety of designating these complicated inflammatory processes, in which peritonitis plays the major part, by the term "chronic cellulitis" can not be justified. What we recognize as "parametritis posterior" is a cicatricial contraction of all the tissues of the utero-sacral ligaments. This is not a chronic inflammation, but simply the relic of an inflammation long since gone; an inflammation more or less acute in the puerperal woman and, therefore, septic in character; or else the result of infection, in the nonpuerperal subject, of the cervical secretions by gonococci or other bacterial organisms. So also must we regard the "chronic cellulitis" in proximity to cervical lacerations. It originally is a mild, acute puerperal infection which runs its course. The tissue changes due to this process, "residues" of inflammation, are more or less permanent even after the cervix has been restored to a healthy condition by trachelorrhaphy. These cicatricial formations, as well as the parametritis chronica, circumscripta, et diffusa of Freund, are of interest to the pathologic anatomist; but we are unable to recognize clinically the existence of the inflammation of which they are the evidence. We therefore deny the propriety of erecting them into a group to be designated as forms of chronic cellulitis. Bandl§ urged years ago that they should be regarded simply as "remnants" of an inflammation long since gone. These remnants are often found in the cadaver. Bandl's extensive autopsic observations were made upon three classes of subjects: (1) Girls under 12 years of age and menstruating virgins. (2) Nulliparous women and prostitutes. (3) Parous women. In the first class "remnants" were rare and were exclusively tubal and peritoneal; none parametric. In the second class "both parametric and peritoneal 'residues' were often found, having their seat around the tubes and ovaries, the latter being connected with each other and with the surroundings of the broad

* Personal statement.

† Cyclopedia of Obstetrics and Gynecology, Vol. XII.

‡ Mann's American System of Gynecology, Vol. I, p. 700.

§ Loc. cit.

ligaments and the peritoneum of Douglas's cul-de-sac by pseudo-membranes. The residues of parametritis are slighter and more obscure than those of peritonitis; but by comparison with normal organs they can easily be recognized. From these researches it is clear that the cellulitis could not have been recognized clinically, being associated with an overshadowing peritonitis whose lesions markedly predominated. Pólk's investigations* corroborate those of Bandl. He states that "in a large number of post-mortem examinations made in the deadhouse of Bellevue Hospital it is noticed that, excepting those patients who have died of septicemia, it is the rarest thing to find cellulitis, unless the cellulitis be clearly secondary to a previous inflammation of the pelvic peritoneum." In Bandl's third class "residues" were even more marked. We can not now, without autopsic evidence, accept the oft-repeated statement that pelvic cellulitis occurs in young girls and old women. I have been able to find no positive proof of its existence in the former and the only authority for its existence in old women is the case cited by Avan. Avan's case was 80 years old and had a swelling on the side of the uterus, which Robin found to contain fibro-plastic cells. One swallow does not make a summer!

Conclusions.—(1) Pelvic cellulitis is an acute form of disease, recognized clinically only in the puerperal woman, or in one who has suffered septic infection after a surgical operation on the genital canal.

(2) Chronic cellulitis is a misnomer.

(3) The occurrence of cellulitis to the extent of forming appreciable exudations in the pelvis is of infrequent occurrence.

(4) Cellulitis to an inappreciable degree, clinically, often occurs in connection with peritonitis. It is discoverable in the cadaver in the shape of small cicatrices, especially in the neighborhood of the tubes and ovaries, between the layers of the broad ligaments, and in the utero-sacral ligaments, and is associated with evidences of extensive peritoneal lesions.

(5) When large exudations form in the cellular tissue the great majority undergo resolution. Suppuration is the exception.

(6) Pus collections in the pelvic cellular tissue are seldom seen in comparison with other forms of pelvic abscess.

Pelvic peritonitis.—The gravest lesions, the most numerous, and the most difficult to deal with in the practice of gynecology are those which are caused by inflammation having its origin in one form of infection or another and which, after obtaining access through the external organs of generation, localizes itself in the endometrium or in the lining of the tubes for a time, and extends therefrom to the pelvic peritoneum and the ovaries, pelvic peritonitis. This infection may be of a mild character, catarrhal, as it is called or it may be very pernicious in its nature, that is, gonorrheal or it may be septic and rapidly fatal. The history of pelvic peritonitis was accurately written thirty years ago by Bernutz. We, his successors, have found little more to do than confirm the results of his labors. It is not until the last few years that they have been fully understood. Pelvic peritonitis is the key to gynecologic pathology. The one constant lesion in pelvic peritonitis is diseased tubes; salpingitis.

Pelvic abscess.—In this paper the term "pelvic abscess" is applied to any collection of pus in the pelvis no matter what its anatomical relations. No just grounds can be assigned for its limitation to suppuration of the cellular tissue. Medical custom and necessity authorize the use of the word "abscess" to mean a collection of pus in the substance of the tissues or in natural cavities.† Pozzi would apply the term to all encysted pus collections whose enucleation would be impossible or dangerous. At the bedside where is the man so wise, with tact so erudite, that he can say precisely what are the confines of the pus cavity? The pelvic abscesses which concern us are those which are located in the cellular tissue, on the one hand,

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*Mann's American System of Gynecology, Vol. I, p. 700.

†See Abscess in Foster's Encyclopedic Medical Dictionary.

and are extraperitoneal; and those which, on the other hand, result from the inflammatory processes that constitute pelvic peritonitis, and hence are intraperitoneal. Extraperitoneal abscesses have already been described.

Intraperitoneal abscesses are found in the following localities:

(1) Ovarian collections, often large, with several compartments having no channel of communication with each other and none with the uterus.

(2) The pyosalpinx cases forming distinct tumors, often simple cystic formations; at other times multilocular in character and, like the ovarian abscesses, fixed by strong and deep adhesions.

(3) Pyosalpinx collections which, by leakage at the fimbriated end, have caused a suppurative peritonitis; the pus cavity being walled in by intestines and oftentimes communicating with the intestinal canal.

(4) Fluctuating tumors between the rectum and vagina, encapsulated by the bridging of false membranes or of intestinal coils between the fundus of the uterus and the rectum. These are complex affairs, always associated with pus tubes, and often communicate by an opening with higher accumulations between the intestines.

(5) Dermoid suppurating cysts.

In the very great majority of cases the pelvic abscesses which we are called upon to deal with will be found to belong to one or the other of these different varieties of intraperitoneal collections. Occasionally we will meet with an extraperitoneal abscess or we may find both varieties present in the same individual; mixed cases.

Diagnosis.—It should be our utmost endeavor in every case to diagnose as accurately as possible the nature of the abscess. The history of the case may be of much assistance. If the patient has not been recently delivered or undergone a surgical operation, we can feel sure that the collection is intraperitoneal. The only exception to this rule that I know of is a possible suppurating hæmatoma. This nearly always implies the existence of an ectopic gestation sac. Even though the case be a puerperal one, the probabilities are that the abscess is intraperitoneal. Careful physical exploration, with a knowledge of the haunts of cellulitic exudations, will generally guide us to the truth. When cellulitic abscesses exist in association with large intraperitoneal exudations a diagnosis may be impossible without resort to abdominal section.

Treatment.—Just so long as the doctrines of cellulitis which I have quoted in the beginning of this paper dominated pelvic pathology, no method was proposed for opening pelvic abscesses except through the vagina or by incision of the outer structures of the abdominal wall above Poupart's ligament. When Tait devised the method of adominal section for pelvic abscesses it was not suggested by a more enlightened pathology; but was undertaken because his experience with the vaginal route had been that the relief thus obtained was, in most of the cases, neither complete nor permanent. The experience of other surgeons with vaginal methods has been, like that of Tait, unsatisfactory.

Let us consider methods of treatment applicable.

(1) To extraperitoneal abscesses.

Operation through the vagina is the operation of election if the abscess lies between the layers of the broad ligaments, or in the cellular tissue between the cervix and rectum, and if it is found that an opening can there be judiciously made. Some broad-ligament collections located high, and extending toward the side of the pelvis, can be better opened by an oblique incision through the structures of the abdominal wall above the groin down to the peritoneum. This membrane being then pushed aside, the finger can be worked downward into the abscess. Other broad-ligament collections extending downward near the rectum can be safely reached by an opening made through the ischio-rectal fossa—"vertical perineotomy," as practised by Hegar and others. Iliac abscesses are to be reached by careful section of the abdominal-wall structures near the iliac crest. In a case of desperate character, no matter what the anatomical relations, I would avail myself of an opportunity to open the

abscess wherever it might point, through the cutaneous surface or through the vagina, but hardly through the rectum, in the hope of gaining time to improve the situation. Yet my experience with the vaginal method of operating, even under such circumstances, has been very unsatisfactory and I would not deliberately select it except for extraperitoneal abscesses. By this method I have cured a few cases and benefited others, but in the main it has been disappointing, and I feel sure it must prove so in the treatment of all intraperitoneal collections.

In one of my experiences the patient had contracted a pelvic peritonitis after standing on damp ground at a funeral. The gastric symptoms were distressing; she lost strength and flesh fast, and after four weeks a tumor was found rising above the pubes on the left side. She was a bad case for operation and I used a trocar, at a venture, through the roof of the vagina, though there was no pointing or spot that seemed favorable for puncture. Thirteen ounces of pus were withdrawn, but no improvement followed. She steadily declined, like one dying with phthisis.

In another the patient was first seen six weeks after a miscarriage, with a fluctuating tumor between the uterus and rectum. It was incised with a knife and its cavity washed out daily with a carbolic solution. In a few weeks it closed, the woman apparently was restored to health, and it looked as though the method of treatment was correct. Yet a few years afterward, she was brought to me in a state of collapse from rupture of a tubal pregnancy. I operated under most unfavorable circumstances and she narrowly escaped death.

In a third case the pelvis was filled with a hard mass, which seemed to be a solid tumor, but the history showed that it was an exudation following labor. The patient's husband would not consent to abdominal section. An incision was therefore made behind the uterus. The finger passed into the abscess cavity was used as a curette. A rubber drainage tube was stitched to the edges of the opening and for one month the most assiduous attention was given to the closure of the abscess, but without avail. I then lost sight of her.

I would not elect the vaginal route for the treatment of any but extraperitoneal collections. Notwithstanding the ingenuity displayed in devising and the skill in performing vaginal operations, the results generally have been unsatisfactory. Pus has been imperfectly evacuated, fistulous drains continue to discharge, and diseased structures remain in the pelvis precluding the possibility of a cure. This statement is made with the knowledge that now and then the trocar or the bistoury has successfully dealt, for the time being, with a unilocular tubal or ovarian abscess after inflammatory processes were quiescent; yet the subsequent history of these cases is not written.

(2) To intraperitoneal abscesses. The ideal method for the treatment of intraperitoneal pus collections is abdominal section followed by the enucleation and removal of diseased structures. There is a period in the history of all intraperitoneal abscesses when this procedure is feasible and safe. Unfortunately, many cases come to us after long delay, with grave complications and the method must be modified. Increasing experience leads us to appreciate more and more the value as well as the gravity of this procedure. In very large abscesses, shock is often great, sometimes fatal. Enucleation may not be possible without doing irreparable injury to bowel, bladder, or other structures. Yet, in the majority of cases, in intelligent hands the method is practicable and safe and it leaves the pelvis free from disease. When enucleation is found impracticable after the section is made, abdominal drainage leads to satisfactory results and to it may be added intelligent vaginal drainage should it seem to be required. In four instances when, after opening the abdomen, I found enucleation impossible and the pus sac too deep to allow the stitching of its edges to the incision, parallel drainage was used after opening and cleansing the abscess cavity. A glass drain was passed to bottom of the sac and a rubber or gauze drain alongside to relieve the peritoneum. These patients made good recoveries and

have remained well for years. Large ovarian abscesses with multiple compartments are difficult to deal with. Such an abscess may fill the entire pelvis, extending from one iliac crest to the other and reaching above the navel. Appearing like a uterine fibroid, it may seem to be a solid tumor, may obliterate the vaginal cervix, and so soften and shrink the uterine body that the operator will require the aid of an assistant's finger in the vagina, after enucleation has been effected, to guide him to the limits of the uterus. The enucleation of such a tumor will involve great shock and the operator's judgment may be taxed to enable him to decide whether to enucleate or to incise, break up the partitions which separate the several cavities, and drain the whole. The saving of life is the first consideration in these cases.

I report here a case of acute ovarian abscess which was treated one year ago. It was that of a young woman with a pinhole os, suffering pain in the right ovary, and sterile after two years of married life. There were no signs of endometritis or salpingitis, but more or less constant pain in the right ovary. Treatment was of little benefit; but after a time, and the use of baths at the Hot Springs of Arkansas, she was relieved of the pain. She then returned to me, having been married three years, for the relief of sterility. There was no exudation in the pelvis, no tenderness on pressure. Under the strictest antisepsis the cervix was divided, the uterus scraped with a dull curette, its cavity irrigated and then packed with a gauze drain. The vagina was filled with an antiseptic tampon. The dressings were removed in due time and all went well for a week, when she had a bloody discharge and pain in the right ovary, without fever. Nausea and complete anorexia were persistent. The pain continued, a globular swelling appeared in the right ovarian region, and after three weeks from the time of the operation the patient was *in extremis*, with a globular tumor occupying the lower half of the belly and extending from one iliac spine to the other. The abdomen was incised and the tumor exposed. Pus was seen oozing through its wall near the lower end of the incision. The sac was opened, stitched to the edges of the wound, and drained. Rapid recovery ensued, leaving the pelvis clear of all appreciable exudation. Enucleation would have been easy, but would, I feel sure, have resulted in the patient's death. A more radical operation could be done later with good prospect of success, if need be.

The pyosalpinx cases must be enucleated. Very large tubal collections occasionally fill up the pelvis, like the ovarian abscesses, and, if their complete removal involved too great shock, could be treated by incision and drainage. Cases of pyosalpinx which by leakage cause a suppurative peritonitis and perhaps establish communication with the intestine can not usually be safely treated by enucleation. Three years ago a puerperal woman was seen in the fourth week after delivery, profoundly septic, with high fever, sweats, and rapid pulse. There was a tumor on the right side of the abdomen. After section and carefully separating coils of intestine, a pus cavity was opened which communicated with the bowel and with the tube on that side. Cleansing and draining was all that could be done. Complete recovery followed and she is well to-day. Still more recently another case was seen, in which from one ilium to the other the abdomen was as hard as a board, and an inch below and to the right of the navel there was a fistulous opening through the abdominal wall. The woman was profoundly anemic and dropsical and had been bedridden the greater part of one year. After confinement, twelve months before, she had puerperal fever. She got out of bed with masses on each side of the uterus. Five months after delivery she was suddenly seized with severe abdominal pain and collapse. An abscess formed and discharged through the opening in the abdominal wall. Wasted as she was by suppurative fever for nine months, she evidently had but little longer to live. Section through indurated structures revealed a confused mass of exudation without landmarks. Cautious breaking up of this opened the abscess cavity and at the same instant there was an escape of water. Two separate cavities had been thus laid open. They were both drained, as was also the healthy peritoneum above. While yet half unconscious from ether, her first cry was that she

wanted to urinate. The bladder had been opened and all the urine for a time came through the drain. She recovered absolutely and completely, without unfavorable symptoms, and is in good health to-day. These cases had not the vitality to stand an enucleation.

Intraperitoneal abscesses discharging through the rectum constitute a difficult class to deal with. In some the sac can be opened, stitched to the edges of the abdominal wound, and drained. The discharge of pus through the rectum will then cease. In others enucleation must be done and the rectal opening closed, if possible, by suture. Some cases may require to be let alone. The fluctuating tumors between the rectum and uterus can, as a rule, be properly dealt with only by section.

Suppurating dermoid cysts constitute a quite common variety of pelvic abscess. They are usually found under complex pathologic conditions. The pelvis is choked with inflammatory masses. Section reveals, perhaps, a small parovarian cyst extending deeply between the uterus and rectum, a large Fallopian tube with greatly thickened walls, and a suppurating dermoid cyst, all blended closely together. Nothing but an enucleation, often attended with great difficulty, can possibly remedy such a condition. No vaginal operation can effect a cure.

In conclusion I would insist that all intraperitoneal abscesses should be approached through the peritoneal cavity by abdominal section, with a view to enucleation and complete removal of the diseased structures which constitute the pus sac, and which, if allowed to remain, are liable to cause a recurrence of pelvic disease. I would deprecate all endeavors to reach these abscesses by extraperitoneal methods, believing, should the complete and radical removal of the diseased tissues be impracticable or attended with too great risk, that drainage through an abdominal incision is safer and is attended with more complete relief than can be obtained by any vaginal operation. Any other conclusion than this is unworthy the consideration of those of us who are now aiming and striving to do thorough work in dealing with the varied problems of abdominal and pelvic disease. Vaginal hysterectomy, proposed by Péan and advocated by Ségond as a substitute for abdominal section in the treatment of pelvic suppuration, commands consideration only from the high character of its authors. This method is applied by them for the relief of all bilateral inflammatory lesions of ovaries and tubes, whether simple or complex, suppurative or nonsuppurative. After removal of the uterus the trocar is used. This method is based on the idea that the primary lesion is found in the uterus and that its existence there perpetuates the disease in the appendages. Its authors claim that removal of the uterus leads to atrophy of the inflamed appendages. The operation is commended on the ground that it is devoid of shock, that it is easy of accomplishment, and that it leaves no visible cicatrix. Vaginal hysterectomy, as here made use of, is in principle but a modification of the old methods of vaginal incision and puncture, and when applied to intraperitoneal abscesses is open to the objection that it must leave in the pelvis diseased structures. The theory that removal of the uterus will eradicate the cause of the disease is a fallacy. Bernutz's dissections showed that though the pelvis was full of exudation masses in some cases the endometrium was healthy, in others it was inflamed, in only one was it covered with pus. We are often cognizant of the fact that appreciable disease has disappeared from the endometrium before we are called upon to operate for disease in the pelvis. In some cases we decide to curette the endometrium before or after enucleation and removal of diseased appendages.

The operation, removal of the uterus *morcellement*, must necessarily be a groping in the dark. What is beyond? Can the finger define pus collections? Can we wisely and successfully evacuate the different compartments of an ovarian or tubal abscess by plunging a trocar into the exudations, as Ségond * is said to do after the hys-

* British Obstetrical Society Transactions, 1892, p. 449.

terectomy? Is it good surgery or is it humane to extirpate the uterus in a woman who, in many of these cases, is suffering from an inflammation which is curable without any operative procedure? Their claim that hysterectomy leads to atrophy of the inflamed appendages is contrary to reason and to observed facts.

Grammatikati has reviewed the after-histories in a number of cases in which the ovaries have been removed, the uterus being left behind, and compared them with the histories of cases where the uterus has been removed by vaginal hysterectomy (Péan and Ségond's operation), the ovaries being left behind. Removal of the ovaries, if complete, is followed in at least half the cases by menstrual molimina, which last for a few months. Then appear climacteric troubles. When the uterus is removed and the ovaries left behind the effects are far more serious, especially in young subjects. The menstrual molimen, which can not find its natural relief, becomes very trying; hence the ovaries should be removed with the uterus. Contrary to what is taught by the supporters of hysterectomy, it appears that the ovaries do not disappear if left behind. Grammatikati examined the ovaries of a woman, 43 years old, three years after he had removed her uterus. He found the ovaries quite normal and full of follicles, some ripening or breaking. *

The Péan-Ségond operation is incapable of producing a permanent cure in most of the grave forms of pelvic suppuration. It is incapable of dealing with those cases in which it is not only necessary to remove diseased organs but to liberate the extensive bowel adhesions associated with them. It is powerless to contend with the cases of pelvic inflammation due to ruptured Fallopian pregnancy. While this method might succesfully drain a suppurating dermoid, the tufts of hair growing from its walls, the plates of bone, and the teeth embedded in its tissues could not be expected to disappear by any process of atrophy or absorption. Lastly, the statistics of the two operations, as furnished by Pozzi, are largely in favor of abdominal section.

DISCUSSION.

Dr. H. J. Boldt, of New York, said:

Mr. Chairman: I can simply say this is the best paper on the pathology of this very common and important affection that I have ever heard. It would be boldness for me to add another word to the able paper of Dr. Maury.

Dr. A. C. Bernays, of St. Louis, Mo., said:

Mr. Chairman, Ladies, and Gentlemen: I am a surgeon and do not belong here in the Section on Gynecology and Abdominal Surgery, but I would like to say a few words on this subject. It seems to me that the operation of Ségond has been very imperfectly translated and very badly treated in the American medical press. Ségond's operation aims to do the same thing that cœliotomy accomplishes, does do the same thing, and in many cases is preferable to abdominal section. In this operation the uterus is not always removed entirely, but only so much of it, whether it be one-half or three-fourths, as may be necessary in order to reach the inflamed and suppurative pelvic tissues. It is intended to remove enough to enable the operator to feel the pus sacs, etc., through the wound cavity. It removes enough of the uterus and vagina to enable the operator to feel or see the Fallopian tubes or pus sacs or abscesses in the broad ligaments or anything else in the pelvis, and I believe that the disease can often be better reached by Ségond's operation than by abdominal section. The statistics of abdominal section for the relief of pyo-salpinx (for which Dr. Price has operated so often and so successfully) shows it to be such a grave operation that I claim that many operators, not so skillful as Dr. Price, could operate just as well or better, and more radically, by the vaginal method. This method aims to drain such pus sacs as can not be removed. I have done this operation only three times, but in each case the result was good. I have operated in the abdominal cavity about one thousand and fifty-five (1,055) times, which, I claim, gives me somewhat

*British Medical Journal, October 1, 1892. Epitome, p. 55.

of a right to have an opinion as to the relative values of the Ségond operation and abdominal section, and it is my belief that the Ségond method will supersede the abdominal operation in many instances.

Dr. J. H. Carstens, of Detroit, Mich., said:

Mr. CHAIRMAN: Every one of us, who has had any kind of experience, knows the difficulty of getting out these pus tubes; how they are adherent to the intestines, bladder, and everything else and I can not understand how anyone can operate through the vagina and take out one-half or one-fourth of the uterus, as the case may be. Of course you may do it blindly in some cases. The tubes are sometimes divided into several sections, like the links of a sausage, and you may clean out one section; but the patient will suffer from the other sections in after years. In abdominal hysterectomy you must take out the ovaries and all the adnexa and I would hesitate to leave any portion of an ovary or ovarian tissue or Fallopian tube in the abdominal cavity if it can possibly be avoided. Dr. Maury says there are some cases where you can not take out pus tubes; but on this point I do not agree with him. With the patient in the Trendelenberg position there is not a tube which can not be gotten out by a good operator. That it is sometimes very difficult I know, but it can be done. I believe that when we can get such good results by abdominal section there is no use getting up complicated operations by cutting out one-fourth, one-half, or three-fourths of the uterus. I think it is blind surgery, and not good practice.

Dr. Joseph Taber Johnson, of Washington, D. C., being asked by the chairman to give his views on Dr. Maury's paper, said:

Mr. CHAIRMAN: I agree so positively with everything Dr. Maury has said as to the pathology of pelvic inflammations, that anything I might add would be but a repetition of Dr. Maury's views. The subject of his paper is very largely the pathology of pelvic inflammations and he draws our attention to the theories of the cause of the disease and I agree with him fully in all that he says. I have never done the operation mentioned by Dr. Bernays, but theoretically I agree with Dr. Carstens in his opinion of it. I believe that we can get at the tubes very much easier through the abdomen than we can through the vagina.

To return to the question of the pathology of pelvic inflammations: I have come to the same conclusions as Dr. Maury, viz, that they are usually the result of salpingitis. The great majority, probably 98 out of 100, of these cases of pelvic inflammation, originate as salpingitis or endometritis. The practical point, after settling the question of pathology, is as to the treatment. My experience has all been gained through the abdominal route. I have seen a number of cases where the pus was attacked through the vagina, but I have never seen a complete cure by that method. Some pockets were not emptied and the woman has continued to suffer. Often the patients have had to wear a drainage tube, which always gives a great deal of trouble and annoyance. In some cases where an abscess has been rooted out by opening the roof of the vagina it has been where it pointed against the vaginal wall. In these cases the single sac of pus is cleaned out and the woman gets well, but that is the only condition in which this operation gives good results. There are some abscesses which we have to treat, when we do not know how much pus may have gone into the cellular tissue, but where we know that it came from infiltration through the pelvic tissues. We have to treat these cases, and should treat them successfully. In such cases we can not do ideal surgery unless we make it ideal in saving life.

Dr. Charles P. Noble, of Philadelphia, Pa., said:

Mr. CHAIRMAN: I did not have the pleasure of hearing the whole of Dr. Maury's paper, but I heard the latter half of it. It has given me a great deal of pleasure to hear Dr. Maury affirm that while pus is generally found in the Fallopian tubes, the ovaries, or within the peritoneum, we do sometimes find it is the broad ligaments. I have reported such cases in the Philadelphia Obstetrical Society. I have met with

six cases in which the pelvis was involved while the tubes were not, but I have never seen such cases except in the puerperal state. I have opened the abdomen in these cases and inspected the tubes without finding any disease in them, but there was pus in the broad ligaments. I believe that this is a very exceptional class of cases, but I think it is very foolish to say that such a thing never occurs. I have been told that even though pus was evacuated, still it was a mistake; that they were cases of suppurating tumor developed in the broad ligament. In Philadelphia it is rank heresy to claim that you can have pus in the broad ligament. I am glad, too, to hear Dr. Maury take the position that in certain cases a patient may be so sick that it is not wise to "clean out the pelvis;" to do an ideal operation. I have always aimed at ideal surgery; but from some unfortunate experiences I have learned, as advised by Dr. Maury, to incise the abscess cavity, irrigate it, and pack with gauze, instead of attempting enucleation in broken-down subjects who will not stand the shock of a difficult operation.

Dr. Maury, in closing the discussion, said:

Mr. CHAIRMAN: I agree fully with Dr. Carstens that it is always possible to get out pus tubes. In reply to the remarks of my friend, Dr. Bernays, I wish to say that I have never done Ségond's operation; but I have read an account of it in the original French without any difficulty and I have taken pains not to misrepresent it. It has been fully discussed by Hendriken and Pozzi and others who recommend it and use it; but I am forced to believe that it is entirely inadequate to deal at all with a large number of inflammatory cases.

The CHAIRMAN. I wish to ask the indulgence of the section for a few moments in order to present Dr. Milliken, of New York, who wishes to show some diagrams illustrating his method of operating for ventral hernia and I trust that no gentleman will leave his seat until Dr. Milliken has finished.

Dr. Milliken then exhibited his plates and showed his method of performing the operation.

The CHAIRMAN. Before a motion to adjourn is put, allow me to deliver to you an invitation from Dr. Howard A. Kelly, of Johns Hopkins Hospital at Baltimore, to attend an operation by him to-morrow afternoon. The operation, which will be for fibroma of the uterus, will take place at the hospital at 4 o'clock and he invites all the members of the section to be present.

THE RELATION OF CERTAIN URINARY CONDITIONS TO GYNECOLOGICAL SURGERY.

By CHARLES P. NOBLE, M. D.,

Surgeon in chief, Kensington Hospital for Women, Philadelphia, Pa.

Early in my career as an operator I lost three patients from suppression of urine following operation. This experience called my attention forcibly to the relation which exists between the condition of the urinary organs and the successful or disastrous results of operation and led me to give the subject careful and systematic study. It is my purpose to record in this paper the observations which have been made and the conclusions which have been reached in a study of some five hundred cases at the Kensington Hospital for Women. It will be convenient to cover the subject by a discussion of several propositions, the discussion being rather from the standpoint of the practitioner than from that of the pathologist.

(*1*) *Albuminuria is a frequent condition among gynecological patients.*—It is my custom to have the urine of every patient admitted to the hospital examined chemically and microscopically. When convenient the urine of patients requiring grave operations is examined repeatedly and this is always done when the first examination proves unsatisfactory. The "heat and acetic acid" and the "ring" (nitric acid)

tests have been used to determine the presence of albumin, being considered the best for clinical purposes. It has been found that 10 per cent of the patients admitted have albuminuria.

(*2*) *Albuminuria often is not significant of serious disease.*—In general medicine it has been learned that albuminuria is by no means necessarily of serious import. Frequently it is of a transient character, due to acute conditions from which the patient entirely recovers. This is even more frequently the case among gynecological patients. The urine of women intended for a chemical examination should always be drawn by catheter. Unless this is done the presence of albumin in the urine may mean only that a certain amount of vaginal discharge, or perhaps of menstrual discharge, has become mixed with the urine. In private practice, when a catheter is not available, the woman should at least be given a vaginal douche and have the external genitals washed before passing urine intended for examination. In this way fairly accurate results may be obtained. Eliminating such external sources of contamination, albuminuria in women may be, and often is, due simply to bladder irritation or to cystitis. Should a careful examination of the urine show the absence of tube casts and the presence of some albumin, pus, and bladder epithelium, especially if the specific gravity is 1.018 or more, it would indicate that the albuminuria was from bladder and not from renal disease. Albuminuria from ureteral disease and from pyelitis is not so very easy to determine and it is to be hoped that the use of the ureteral catheter in the study of this question may help to make it clear. Albuminuria from the above sources does not unfavorably influence the prognosis of operations. Albuminuria of renal origin is not always significant of serious disease. At times it is not accompanied by the presence of tube casts in the urine and is of an intermittent character; in such cases being due probably not so much to the renal disease as to some interference in the metabolism of the nitrogenous food products. Several such cases have been under my care; and quite recently I performed ovariotomy upon one in which large quantities of albumin would be present on one day and the next day it would be entirely absent. The urine was otherwise normal. The urinary condition was not at all influenced by the operation. Repeated examinations of the urine in this case showed the absence of tube casts and I believe that the kidneys are perfectly sound. Another class of cases in which albuminuria of renal origin is not significant of danger is that in which it is produced by the presence of large tumors. Here the presence of the albumin is due to the pressure of the tumor upon the renal vessels.

(*3*) *The presence of tube casts in the urine is not always significant.*—In the cases of large tumors, even the presence of tube casts in the urine does not signify that the patient will not recover from operation. In many such cases the condition of the kidneys is directly due to the pressure of the tumor, and when this is removed such patients often get surprisingly well and their kidneys become practically normal. But all gynecological cases requiring operation and having tube casts in the urine require, in my judgment, the most careful consideration. Repeated examinations of the urine to determine not only the presence and quantity of albumin, casts, and sugar, but also its specific gravity, the total amount of the urine passed, and the amount of urea and other solids it contains, are of the greatest importance. Should such examinations show the existence of gross structural disease of the kidneys and indicate the early death of the patient from the kidney disease, it is more than questionable in such cases whether it is wise to operate. The existence of chronic interstitial nephritis (contracted kidneys) is a contra-indication to any operation of gravity. In such cases at times albumin is absent or only occasionally present and then in very small quantities. Tube casts may be absent or, at least, the most careful examinations may fail to reveal them. If repeated examinations of the urine show the occasional presence of small quantities of albumin and of granular casts and a low specific gravity, the surgeon should be on his guard. A woman having such kidneys will not survive a serious and prolonged operation. She will

die from shock or from suppression of the urine. I believe that the prognosis after operation is most favorable in women (the subjects of renal disease) having fairly large tumors, especially ovarian cysts. In this class of cases, in general, the operation is quick and easy and no septic material is present. By the operation the pressure of the tumor is removed from the crippled kidneys with the result that they secrete usually more urine than normal kidneys. An illustrative case will be given. When kidney disease complicates a small tumor (or, in other words, when the kidney disease is not dependent on the presence of the tumor), the prognosis depends entirely upon the character and extent of the kidney disease. The factor of the removal of the intra-abdominal pressure does not come into play in such cases. In cases of tubo-ovarian inflammation, especially of marked character in women whose health is entirely broken down, the prognosis is very bad when the renal disease is of a serious character. The reason why such cases do not do so well after operation as cases of large cysts is clear. The factor of the removal of the intra-abdominal pressure is absent here and in addition we have a long operation, involving considerable handling of the pelvic viscera and usually the escape of septic matter into the peritoneal cavity, necessitating irrigation and drainage. The long operation and the handling of the abdominal viscera promote shock and such patients are apt to die from suppression of urine. I speak from the experience of two deaths in this class of cases. Occasionally women will have suppression of urine after operation, even when no kidney disease exists. I have had one such case, in which the operation was very simple.

(*4*) *The secretion of urine is diminished after operation for several days.*—This statement is a matter of universal observation. I have had careful records kept of the amount of urine passed by patients after abdominal section in all my cases. These records are practically accurate. In the time at my disposal it was not possible to look through the entire list of cases, hence I have selected the last fifty consecutive cœliotomies for tabulation. Dr. W. E. Parke, assistant in gynecology at the Kensington Hospital for Women, has kindly prepared this table for me. We find that the patients pass on an average 10 ounces of urine the first day after abdominal section, 15 ounces the second day, 13 ounces the third day, 15 ounces the fourth day, and 19 ounces the fifth day, after which time the amount gradually increases. There are certain sources of error in this table. The first day really includes only about eighteen hours and is made up of that part of the day subsequent to the hour of operation and the following night. The other days are twenty-four hours each. On the third day, at times, the amount of urine is estimated because upon that day the patient's bowels move. With the free purgation naturally the amount of urine secreted is less. The same source of error exists for the subsequent days. One patient died at the end of twenty-four hours; a slight source of error for the following days. The smallest amount of urine passed on the first day was three ounces, the largest amount 33 ounces. The smallest amount passed on the second day was 6 ounces, the largest amount 29½ ounces.

As illustrating what I have said with reference to the relation of the condition of the urine to operation, I will make brief reference to the following cases:

Case 1 illustrates the fact that suppression of urine may follow cœliotomy even after simple operations in women having sound kidneys. This patient had healthy kidneys, and the operation consisted in removing the ovaries, the seat of chronic inflammation; yet on the third day she developed an acute nephritis, was extremely ill with uræmic symptoms, but fortunately recovered. The history of case 1 is appended.

Case 2 illustrates the danger of death from suppression of urine after even a simple cœliotomy in women suffering with well-marked chronic kidney disease. This woman had small, contracted kidneys and was a physical wreck at the time of operation. The operation consisted in the quick removal of a small ovarian tumor and of a small parovarian tumor, the operation consuming only fifteen minutes. In this

case the kidney disease had antedated the presence of the tumor, and the vitality of the woman was so reduced that the shock from even so simple an operation caused death from suppression of urine.

Case 3 illustrates the favorable issue of operations for large ovarian cysts when albumin and casts are found in the urine as a result of the presence of the tumor. This patient was a feeble and greatly emaciated woman, who consulted me when the ovarian tumor was very large, quite nodulated, and very painful. The presence of albumin and granular casts in the urine, the nodular outline of the tumor, and the fact that it caused great pain (giving rise to a suspicion of malignancy) caused me to give a guarded prognosis as to the issue of the operation. The patient's conclusion was that, as I could not promise her positively that she would recover from the operation, she would live as long as possible with the tumor and then have it out. She carried out this purpose literally and it was not until her kidneys were greatly crippled and she was suffering with paresis of the bowels and with orthopnœa from the pressure of the growth that she desired operation. The removal of the tumor was easily accomplished and she made as good a recovery as any patient upon whom I have ever operated. Curiously, she passed very much more urine after her operation than is the rule, the first day passing 29½ ounces; the second day 13 ounces, which was measured, and very much more with bowel movements; the third day 25½ ounces, etc. The condition of the urine constantly improved, and at the present time, six months after operation, it is perfectly normal.

Cases 4 and 5 illustrate the grave prognosis as to operations done for well-marked inflammatory conditions of the uterine appendages in women having serious chronic renal disease. Case 4 had small, contracted kidneys and was the subject of both gonorrhœa and syphilis (tertiary). Her general health was fairly good. The operation consisted in the quick enucleation of diseased uterine appendages from a pelvis absolutely filled up with exudate. The duration of the operation was thirty-five minutes. She went to bed in good condition, did well for two days, then developed uræmic symptoms, and died on the fifth day.

Case 5 was perhaps the worst subject (from the standpoint of renal disease) for a serious operation in my experience. She had been an invalid for several years, had albuminuria due to large white kidneys, and was so debilitated at the time of the operation that she had been confined to her bed for some weeks. This was one of my early operations, and I might here add that I should not operate at the present time upon such a patient for tubo-ovarian inflammatory conditions. The operation was extremely difficult and lasted forty minutes. Upon the left side, in addition to the diseased tube, a small, intraligamentous ovarian cyst (the size of an orange) was removed. When the tumor was enucleated from the broad ligament the ureter came up with it. This was separated and dropped back. It was observed to be very much thickened and the supposition was that the woman had a surgical kidney, which proved to be the case. Suppression of urine followed the operation, and she died on the third day.

Case 6 illustrates the fact that albuminuria and even casts in the urine, when due to acute inflammatory conditions of the pelvis (and personally I believe that cystitis and nephritis are often induced by suppuration connected with the uterine appendages), are not a bar to a successful result after operations done for the removal of the diseased uterine appendages. Miss P., aged 19 years, contracted gonorrhœa in December, 1892. She had a sharp attack of pelvic peritonitis in that month, a second one in January, and a third one in March. In April and May she bled very freely from the womb and when I saw her in consultation I found the bed elevated to prevent syncope. Examination showed a large, fixed mass to the right of the womb and a hard, doughy mass extending behind the womb and to the left of the pelvis. The history of the case and the physical conditions present suggested a diagnosis of ruptured extra-uterine pregnancy. It was recognized, however, that the conditions might be due to tubo-ovarian inflammatory disease. This patient's urine contained

a large amount of albumin and some hyaline casts; but its specific gravity was 1.032. Operation showed a suppurating right ovarian tumor and double pyosalpinx. She made an uninterrupted recovery, passing 16 ounces of urine the first day, 15 ounces the second, 16 ounces the third, 18 the fourth, etc. The condition of the urine is now normal.

In conclusion, I would emphasize especially the following points:

(1) The importance of the systematic examination of the urine of gynecological patients, especially of those requiring cœliotomy.

(2) That the presence of albumin and of casts in the urine need not affect the issue of the operation.

(3) That serious and prolonged cœliotomies involving much handling of the abdominal viscera, in women having chronic Bright's disease (especially the small, contracted kidney), usually terminate fatally.

(4) That the prognosis is best when the presence of albumin and casts in the urine is due to the pressure of an ovarian cyst which can be quickly removed.

The histories of the following cases have been prepared by Dr. H. E. Applebach, assistant surgeon to the Kensington Hospital for Women:

Case 1.—Mrs. V., æt. 30, IIpara; one miscarriage; menstruation regular; leucorrhœa marked.

History: Health has been wrecked through child-bearing. Has had very grave vomiting of pregnancy each time when pregnant and puerperal sepsis after each labor. Is extremely prostrated.

Examination shows tender ovaries.

Operation: Abdominal section, January 29, 1892. Removal of both uterine appendages. Duration, half an hour. No drainage.

Course: Interrupted by acute nephritis on third day. Amount of urine passed: first day, 13 ounces; second day, 12½ ounces; third day, 16 ounces; fourth day, 13½ ounces; fifth day, three quarters of an ounce. She made a good recovery.

Urine: Examination prior to operation negative. The urine became normal within a month and has remained so.

Case 2.—Mrs. W., æt. 40, XIIpara; five miscarriages; menstruation irregular; leucorrhœa very marked; appetite poor; bowels costive; urine 0.

History: Health has been bad eight years. Backaches; pain in abdomen, head; hæmorrhoids. Bleeding from uterus quite marked on three occasions at intervals of six weeks. Repeated fainting attacks.

Examination: Masses in both ovarian regions.

Operation: Abdominal section, September 4, 1890. Removal of uterine appendages. Ovarian cyst on right side, parovarian cyst on left side. Duration, fifteen minutes. Drainage.

Course: Uræmia set in on third day, resulting in death. Amount of urine: first day, 12½ ounces; second day, 3½ ounces during night (no report for day); third day, died.

Urine: Examination of urine proved negative before operation.

Autopsy: Small, contracted kidneys. No peritonitis.

Case 3.—Mrs. A., æt. 50, 0para; no miscarriage; menstruation, menopause at usual time; no leucorrhœa; appetite poor; bowels costive; urine scant, with albumin.

History: Has been unwell for past four years with distressing symptoms of stomach indigestion, etc. Enlargement of abdomen noticed during past fourteen months; quite rapid the last six months. Marked loss of strength and emaciation.

Examination: Large right ovarian cyst.

Operation: Abdominal section, February 4, 1893. Removal of right appendage and tumor. Irrigation and drainage. Duration, forty-five minutes.

Course: Uninterrupted.

Urine: Repeated examination of the urine for two months prior to operation showed marked quantities of albumin, with few casts (hyaline) at different times, not uniformly present. The quantity averaged 20 ounces for twenty-four hours. Quantity of albumin not materially affected by treatment. On day before operation amount of urine voided and by catheter 13 ounces. First day, 29½ ounces; second day, 13 ounces during night (frequent bowel movements prevented measuring of urine during day); third day, 25½ ounces; fourth day, 25½ ounces; fifth day, 28 ounces. The quantity of urine steadily increased after operation, with diminution of albumin. At the end of four weeks quantity of urine normal, slight trace of albumin. Two examinations since discharge of patient show negative results.

Case 4.—Mrs. M., æt. 31, 0para; no miscarriage; menstruation too frequent (painful before period); cramps; leucorrhœa irregular.

History: Has abdominal distress, headache, backache. Had six or eight attacks of pelvic peritonitis. Had two attacks of gonorrhœa from husband.

Examination: Tubo-ovarian masses on both sides.

Operation: Abdominal section, May 7, 1890. Anesthetic, ether. Removal of uterine appendages; adhesion very dense; enucleation difficult. Duration, thirty-five minutes. Irrigation and glass drainage.

Course: Gradual uræmic intoxication, resulting in death.

Urine: Examination of urine negative prior to operation. After operation quantity of urine voided ranged from 8 to 18 ounces.

Autopsy: Small, contracted kidneys. No peritonitis.

Case 5.—Mrs. R., æt. 29, I-para; no miscarriage; menstruation regular during first week, free, not much pain; leucorrhœa marked; appetite poor; bowels costive; bladder irritable.

History: Has been an invalid for several years, marked pains in the head and womb alternating. Had inflammation of the bowels and ovaries for a year after her labor.

Examination: Uterus retroverted. Tubo-ovarian masses on both sides, especially on right side.

Operation: Abdominal section, March 7, 1890. Removal of uterine appendages; adhesion very dense. Right ureter was attached to intraligamentous tumor, very much thickened; was freed and dropped. Duration of operation, forty minutes. Irrigation and glass drainage. Anesthetic, chloroform.

Course: Suppression of urine followed operation after twenty-four hours; on second day quantity by catheter and voiding, ten ounces; on third day, one ounce by catheter; death third day.

Autopsy: Right ureter and pelvis of right kidney dilated; large, white kidneys. No peritonitis.

Case 6.—Miss P., æt. 19, 0-para; menstruation regular until the past two months, metrorrhagia since; very severe pain with last two periods; leucorrhœa, history of a well-marked attack of vaginitis in December, 1892.

History: She was a healthy girl until December, 1892, since which time she has had three severe attacks of peritonitis, and is at the present time confined to bed from pelvic soreness and from the effects of severe uterine hæmorrhages.

Examination: Vagina relaxed. Womb enlarged, pushed forward and fixed. External os quite patulous. A large, fixed mass can be felt upon the right side of the pelvis, which is palpable above the superior strait. A doughy mass, continuous with the first, can be traced across the pelvis behind the womb.

Urine: Examination before operation showed albumin marked; hyaline casts; specific gravity 1.032.

Operation: Abdominal section, May 7, 1892. Removal of uterine appendages and tumor of right ovary. Adhesions were universal, but friable. Time of operation, fifty minutes. Irrigation and glass drainage.

Course: Marked shock when put to bed; pulse 160. She rapidly improved and made an uninterrupted recovery. The amount of urine passed: first day, 10 ounces; second day, 16 ounces; third day, 15 ounces; fourth day, 16 ounces; fifth day, 18 ounces. Three weeks after operation the urine is normal.

DISCUSSION.

Dr. A. Lapthorn Smith, of Montreal, Canada, said:

Mr. CHAIRMAN: I have had great pleasure in listening to this paper of Dr. Noble's, because the subject is one that has caused a great deal of trouble and every one should know whether the presence of albumin in the urine should prevent operation. My own experience fully bears out what Dr. Noble has said, that when there is a large tumor, no matter of what kind it may be, we may be almost certain that the albumin will disappear after the removal of the tumor. I have one case in mind where, in order to give the patient temporary relief, I slowly withdrew a pail of water from the abdomen, after which I was able to distinguish two large ovarian tumors. Afterwards the albumin became much less from the withdrawal of the pressure of water in the abdomen. I also recall a case of albuminuria due to pregnancy in which there was a cessation of the albumin after the removal of the pressure. In Dr. Noble's paper there is an element of error; that is, that the quantity of urine secreted after abdominal operations is very scanty for a day or two. That may be due to the fact that the patients are deprived of water for several days and I

believe that a small quantity of water should be given them to equalize the loss of serum. I was expecting that he would mention the fact of ether producing albuminuria after operations in cases which did not suffer from it before. I feel certain that prolonged administration of ether will cause albuminuria by producing irritation of the kidneys. Chloroform will not produce this condition if given for an equally long time and I believe that in all cases where we fear albuminuria we should use pure chloroform, though I generally use the A. C. E. mixture.

Dr. Joseph Taber Johnson, of Washington, D. C., said:

Mr. CHAIRMAN: This paper gives me a great deal of comfort, because I have been frequently thrown into a state of agitation by the report of my nurses that my patients were passing very small quantities of water and I have not been able to separate those cases where the patients passed but 10 or 15 ounces of urine in the first 24 or 36 hours from those where the urine was being gradually suppressed. Sometimes I would take quite active means to make the kidneys secrete a larger amount of urine, for I have not been certain whether this small quantity of urine secreted was the beginning of total suppression or whether it was only the usual temporary diminution of the secretion. But it is not only in laparotomy cases that we have this condition, for I remember one case of laceration of the cervix and perineum which I had seen but once or twice before the patient came to me to be operated on. On the morning of the operation her urine was examined and was found to contain no albumin, but her urine gradually became suppressed after the operation and she died from uræmic coma on the sixth day afterward. I subsequently learned from her husband that she had had chronic Bright's disease. It seems to me that we should not be satisfied with one examination of the urine just before the operation, but should make several analyses.

Dr. Eugene Boise, of Grand Rapids, Mich., said:

Mr. PRESIDENT: It occurs to me that in this temporary suppression of urine there are various factors which should be taken into account. It is not necessarily due to any chronic kidney trouble; the irritation of the kidneys set up by the ether is one of the most prolific sources of suppression of the urine; so also are operations in the abdominal cavity whereby the blood vessels unload themselves and there is an outpouring of serum into the cavity. These, with shock and profuse perspiration, are factors which may produce temporary suspension of the functions of the kidneys. The best way to treat such cases, in my estimation, is not by the use of drugs, but by introducing through a tube into the bowels a large quantity of water. The adding of fluids to the system by this means would supply the necessary amount of fluid to the tissues, and so compensate for the drain of serum from the blood vessels.

Dr. J. H. Carstens, of Detroit, Mich., said:

It gives me great pleasure, Mr. President, to indorse what Dr. Noble has said. I have been unfortunate in the last year in having lost two cases out of a hundred operations, by uræmic poisoning. It seems to me that this is a question of pathology. I thought that ether had something to do with my fatal cases in former years. I afterwards used chloroform; but I lost some cases even then, so that I do not know even now whether the chloroform or ether really had anything to do with it. I look at the matter in a different light, and it seems to me that it is not a question of pressure on the kidneys at all, but that the trouble is in the solar plexus of nerves. It may be due to septicæmia existing in the system and poisoning the solar plexus; but at any rate the solar plexus is at the root of the trouble. When a patient shows symptoms of uræmic poisoning it is not my practice to give any drugs to act on the kidneys, already irritated, but I give her steam baths, and in order to supply the necessary liquid to the system I introduce water into the bowel and allow the patients to drink water. In addition, in order to keep up the strength, they are given hypodermic injection of strychnine and atropine.

Dr. I. S. Stone, of Washington, D. C., said:

Mr. PRESIDENT: I consider the subject of Dr. Noble's paper of more importance than any other which has yet been read. In considering the advisability of an abdominal operation objections of this character are more insuperable than anything else. I have had a sad experience lately when I lost a patient from suppression of the urine. She had taken ether and I naturally thought that the ether was responsible for her death; but if she had taken chloroform, death would have been attributed to that cause. She had been treated for tapeworm and had pelvic abscesses. Before the operation the resident physician carefully studied the condition of her kidneys and the report was that she had no albumin nor pus and that the quantity of urine was normal. I operated and the operation took nearly an hour. I thought the operation was well done and the post-mortem examination showed that such was the case. The kidneys were found congested and their pelves contained pus. This case calls to mind the impossibility of ascertaining the condition of the kidneys in many cases. We have some cases where we do not know whether the anæsthetic produces the albuminuria or whether Bright's disease was present. In desperate cases, however, even though I found albumin in the urine, I would operate. In many cases I have operated, using ether or chloroform indifferently, and the result has been about the same. In some cases I think the result may be due to what Dr. Loomis, of New York, calls general fibrosis. Shock enters into nearly every operation of this character, and in some cases may be the exciting cause of the albuminuria.

Dr. R. Stansbury Sutton, of Allegheny, Pa., said:

Mr. CHAIRMAN: The question of death from renal complications after abdominal operations gives a great deal of anxiety to the surgeon, for he always feels that he is more helpless in dealing with this than with any other complication which may present itself. There are some points in regard to the pathology of this condition which either we do not thoroughly understand or else do not fully appreciate. Why is it that you abdominal surgeons, if you have trouble in the kidneys after an operation, say that the ether does it? If a man cuts off a leg and albuminuria shows itself in a few days, he does not attribute the albumin to the use of ether. Once in awhile the ureters get tied, or sometimes get stripped up or interfered with in some way. The fact of abdominal shock differing from other shock may also have some effect on the kidneys. The passage of the catheter, especially on the male, is a similar case. The possibility of a preëxisting, but latent, kidney disease being started up by an abdominal operation or by the use of the catheter (which may set up cystitis) must also be taken into consideration.

I wish the writer had given more attention to the question of whether or not the use of ether has anything to do with the development of albuminuria. I live in a town where ether has to be given and I should be very glad to hear the views of this section, especially of those members of it who live in places where chloroform is used, as to whether or not this has anything to do with it. Another thing to be borne in mind is that sometimes the kidney is actually infected before the operation. I operated on a case of fibroid tumor last week, in which the patient had begun to have chills and from May to August she had chills every other day. I removed, without difficulty, a large fibroid tumor which, when it was opened after the operation, had about a quart of pus in it. I removed the whole uterus (there were no adhesions), packed the vagina with iodoform gauze, and dressed the wound tight and clean. She never passed, in the three or four days that she lived, more than 8 or 9 ounces of urine. I made a post-mortem examination and in one kidney was an abscess which I think must have been there before the operation. Germs were circulating in the urine, for the shock had stopped the secretion of the kidneys long enough to allow the germs to find lodgment. Other diseases of the kidney (notably after scarlet fever and diphtheria) are formed by germs which should be passed directly out of the system; but when there is a condition of shock the kidneys are inactive and allow the germs to effect a lodgment.

The CHAIRMAN. I would like to remind the section that in order to discuss the influence and relative merits and demerits of anæsthetics, a special meeting will be held this afternoon by this section, together with the sections upon Surgery and Therapeutics.

Dr. Noble said, in closing the debate on his paper:

Mr. PRESIDENT: I am very glad that my paper should have elicited such a good discussion. With regard to the point made by Dr. Smith as to the influence of water given in order to compensate for the water which is lost from the system after an abdominal operation, I consider it an excellent one, and it is a large factor in the successful treatment of such cases. Dr. Kelly's patients pass more water than mine, but on inquiring I found that he gives them more water than I do. As I said in closing my paper, I did not take up the subject of ether versus chloroform. I was brought up in a school where it was taught that ether was irritating to the kidneys and that chloroform was not; but I have had death result from the use of chloroform. Dr. Carstens says that in the past year he has given nothing but chloroform; but he has had two deaths from suppression of the urine. In countries where nothing but chloroform is given, deaths from operations when surgical kidney is present are as common as here. The fact that ether will produce albuminuria is undoubted; but I find from reading recent discussions, especially in European societies, that chloroform will produce it even more frequently than ether. So good a chemist as Lawrence Wolff, of Philadelphia, denies absolutely that ether is eliminated by the kidneys. With reference to the choice of anæsthetics I am on the fence and waiting for developments, but I feel inclined to use ether. In regard to the case brought up by Dr. Johnson, I think that the diagnosis between beginning suppression and merely scanty urine may be best made by the general condition of the patient. It is more difficult, as suggested by one of the speakers, to make a diagnosis between septicæmia and suppression. I think the diagnosis is oftentimes very difficult, and frequently a patient dies and we have to make a post-mortem to see whether the patient died from suppression of urine or from sepsis. I agree entirely with the statement made by one of the speakers that there are a number of cases when you can not tell whether the patient has chronic Bright's disease by examining the urine. Dr. Stone has raised the question as to whether arterio-sclerosis can be considered as a causative factor in these cases. This is a condition antedating Bright's disease and is to be diagnosed by examining the heart and pulse rather than the urine. I am led to believe that suppression of urine is due not so much to the anæsthetic as to the whole series of circumstances; the cold room, the refrigeration of the body, and everything else rather than the anæsthetic. In regard to the treatment of these cases by flushing out the bowel, I consider it a most excellent one. I recall the case of a woman who was brought in with suppression with eclampsia. The stomach tube was introduced and the stomach filled up with water from above, and the patient was cured; so that the fluid may be introduced into the system from above as well as from below.

DRAINAGE OF OVARIAN CYSTS, WHERE THE ADHESIONS ARE SUCH THAT IT IS IMPOSSIBLE TO REMOVE THE SAC BY CŒLIOTOMY.

By A. VANDERVEER, M. D., Albany, N. Y.

In the diagnosis and treatment of ovarian cysts it is, I think, admitted by all that little more can be said in that direction than has already been said. Without fear of contradiction it may be asserted that each operator has his particular technique that he follows with conscientious care. There may be some slight deviation in the method of emptying the sac, in applying the ligatures, or in the use of the cautery to the pedicle, and in closing the abdominal incision. This paper is not intended to touch upon such points. Now and then we meet with a case presenting

such strong adhesions of the sac to the various organs that the question is at times forcibly impressed upon us: How far shall we go in making a prolonged operation without immediately producing in such marked shock as to complicate seriously the patient's living many hours, or death resulting? The latter event is always detrimental to our would-be successful operations in the particular neighborhood in which the patient resides. The pathologic conditions and changes, the symptoms that are associated with the formation of adhesions in the developing of a case of ovarian cyst are, I am quite certain, at times passed over too lightly; that is, the patient not infrequently does not lay sufficient stress upon the history of her case when detailing it to the family physician, or to the surgeon who is about to operate. Localized pains are not sufficiently emphasized, slight accidents are forgotten, and adhesions have resulted, very often out of proportion to what seemed trivial causes and conditions. Again, on the other hand, patients are not infrequently subjected to too many examinations this being quite often the fault of herself or friends. They are desirous of seeing too many physicians and an undue and severe handling of the case may bring about localized pain or peritonitis, resulting seriously when the time comes for operation. There is often an additional and unnecessary nerve strain given to many patients by too frequent and too severe methods employed in the examination of cases of suspected abdominal tumors. Members of our profession have learned fully the danger that results from the use of the aspirator and trocar, and in that direction patients have been relieved from the employment of measures that afterwards so frequently produce adhesions externally, as well as suppuration within the sac. Then, again, cases may be examined with ever so much care. We learn all that is possible of the previous history, as to traumatisms that may have occurred, with or without marked evidence of local pain and peritonitis having supervened, and yet serious adhesions may be present. Some women will tolerate much more readily than others the pains that result in peritoneal adhesions. We know that no two cases go on precisely alike. The rapidity with which adhesions will sometimes form in one case and the extent of their development is out of proportion to some other cases where the etiological factors have been equally as great. Very properly an operator of experience at the present time does not subject his patient to too long and too nerve-depressing examinations. I take it the experienced operator of to-day has not, by any means, given up the term exploratory incision in such cases as present with an indefinite history, yet in which adhesions are suspected, though the incomplete operation grows less and less as the number of his cases increase and he becomes more familiar with the operative procedure pertaining to the removal of tumors with many complications.

To reach our subject a little more closely we have made our diagnosis in many cases and are satisfied that adhesions are present, probably of that variety too strong to yield to the pressure of the sponge or careful use of the hand, that many ligatures will be required, and that possibly adjacent organs may be implicated to the extent that will make the operation exceedingly tedious and dangerous. An exploratory incision is decided upon which, not infrequently, confirms our suspicions as to the grade and extent of these adhesions. The patient somewhat, and the friends in particular, are prepared for a severe and tedious operation, the judgment of the operator alone being relied upon to bring the case through successfully. I have not infrequently asked myself the question when having to deal with such cases and the patient has been subjected to an operation of an hour, one hour and one-half, or two hours, nearly dying, or perhaps doing so within twenty-four or thirty-six hours from the shock resulting from so prolonged an operation, would it not have been better to have shortened the time in some way, leaving portions of the sac, or the cavity formed from the adhesions to be drained and thus not carrying our patient too near the condition of exhaustion that results in immediate death? Will not drainage save more patients and bring our cases into a far more comfortable atmosphere of treatment, a larger percentage to go on to permanent recovery, although

somewhat tedious, yet not producing that shock and depression upon the friends and neighbors as does death upon the table, or a few hours after the operation?

Take the following case as one for illustration, although not an ovarian cyst, yet having the form of adhesions to large intestines that I wish more particularly to emphasize in this paper:

Case 1.—Miss McD., aged 40, unmarried, housewife by occupation; entered St. Peter's Hospital May 11, 1887, giving the following history: I had had her under observation for nearly ten years, during which time she had enjoyed very good health, with the exception of an enlargement of the lower portion of the abdomen, on the left side. When first noticed it was about the size of a small lemon. This increased very gradually without giving her very much pain at any time. Up to two years ago she had suffered no serious inconvenience and at that time I urged her to have an operation. The clinical history, direct physical examination, symptoms, all indicated it to be a case of subperitoneal fibroid, with probable attachment to the left side of the uterus. She had, however, always objected to an operation. During the past two years she has suffered very much more pain and the tumor has increased somewhat rapidly, now, at the present time, filling the entire abdomen, pressing up against the diaphragm, pushing the intestines and contents of the abdominal cavity back into the lumbar regions and behind the liver and above the spleen. One year ago she was quite ill with an attack of localized peritonitis. She is now desirous of having an operation, knowing that the obstruction to the bowels, the pressure upon her stomach depriving her of food; all of her discomforts convincing her and her friends that in her present condition she can not survive long.

Operation May 12, 1887: The tumor was exposed and a distinct pedicle found connected with the left cornu of the uterus, capable of being ligated, but extensive adhesions were discovered connected with the omentum, firmly attached to the ascending transverse and a portion of the descending colon. The tumor was found undergoing cystic degeneration. The loosening of the adhesions became very tedious; it took a long time to free them from their attachment to the tumor and, in fact, in some places the walls of the tumor were dissected off. Hæmorrhage controlled, the surfaces of the portion of the sac brought together, leaving a mesenteric attachment with the intestines. Glass draining tube with gauze packing employed. No hæmorrhage indicated, and but a moderate amount of serum drained.

Operation occupied one and one-half hours. Patient recovered fairly well from the effects of the anæsthetic, ether having been given, became thoroughly conscious, but died from absolute exhaustion at the end of thirty-six hours.

In the light of experience gathered from other cases since, I realize that I could have shortened this operation, bringing a portion of the cyst wall, with the adhesions, into the wound, stitching them there, and draining. I know of no other abdominal work that presents with it so great anxiety as the loosening and breaking up of these strong adhesions, particularly when any portion of the intestinal tract is implicated.

Resecting portions of the small intestines becomes possible, yet great care must be exercised here in seeing that the mesenteric attachments are preserved. But when large intestines are involved resection or anastomosis becomes very much more serious. Adhesions to the solid structures situated in the abdominal cavity give us sufficient anxiety without doubt, but can be managed much more successfully than when we encroach upon the caliber of any portion of the intestines.

It is fortunate for the operator that these cases are not many in number; it is fortunate for us that they are growing less; yet, now and then, as I have stated, for some unexplained reason, adhesions form very quickly, much more so in some cases than in others. Some patients have a pain, not particularly distressing to them, not putting them to bed altogether, but it is the pain, nevertheless, of adhesive peritonitis, and we find cases where the clinical history is out of all proportion to the serious adhesions that present. Neglected cases of ovarian cyst will yet present occasionally and the question seems so pertinent to us as operators: How far shall we prolong the operation; to what length shall we carry it? Must we not exercise the greatest care in taking into consideration the strength of our patient; and is it not better to cut short an operation, and, if possible, drain a portion of the cyst wall, with adhesions, than to pass too many anxious hours in carrying our patient out from the condition of exhaustion or, sadder still, to friends of the patient and interest

or operative surgery, witness a death from our overwork in attempting what is really too much for her to bear? Although this procedure of drainage is a somewhat tedious one, yet I feel called upon to emphasize the fact that it carries our patient out from the domain of immediate death and thus does not bring to the friends and relatives that depressed condition of the mind, that aversion they ever afterwards have to any form of surgical interference.

Dr. John Homans, as well as many other able operators, has given us a record of cases in which it was found necessary to stitch the sac (owing to the severe adhesions) into the abdominal wound and drain. Can we, however, say or admit that our text-books have placed sufficient importance upon this line of procedure? I can not just now give the relative percentage between my cases of drainage and completed operations (but will be able to do so very soon in another paper), yet, to illustrate somewhat more fully my present subject, I desire to speak of the following cases somewhat briefly:

Case 2.—Mrs. O. F., aged 40, married, housewife by occupation, mother of two children. Presented a very good record of health. Entered the Albany Hospital October 6, 1887, having been seen only recently by Dr. Robert Selden, of Catskill, N. Y., and who advised an immediate operation.

Records of the hospital state that four years previous she first noticed a tumor located on left side and supposed to be about the size of a child's head. It grew slowly until June, 1887, and has since then increased very rapidly. Patient has lost much in flesh and strength; bladder irritable; abdomen much distended; tumor fluctuating, and a hard body is felt over the surface of the vaginal vault. Patient has never been tapped. Has received several traumatisms and suffered much from localized peritonitis. Abdominal incision was made and 13 pints of very offensive liquid pus removed. The cyst wall was so adherent to the viscera that removal of the sac became impossible and it was found necessary to stitch the opening in the sac into the abdominal wound by continuous suturing; yet even in doing this it was impossible to hold the sac; it was so friable and rotten that at the point of union, where the drainage tube was introduced, the cyst wall was lost sight of. Drainage was attempted but was not so thoroughly successful as could be wished. Owing to some family distress she was obliged to return home the next day. The wound soon closed after that and on November 9 her physician, realizing that the sac was filling, aspirated, removing a pint of liquid pus. Between that time and January 23, 1888, she was tapped twice, 20 pints of pus being removed in all. She was now urged to have permanent drainage established and the remaining portion of the cyst washed out, but she was so unfortunately situated that it was impossible to carry out the suggestion. She was aspirated again, but ultimately died from an attack of pneumonia.

This case, could she have had proper nursing and thorough drainage kept up, I have no doubt would have made a permanent recovery. I feel quite certain that had we persevered in attempting to remove the adherent cyst she would have died early from shock.

Case 3.—Mrs. C. H.; aged 55; married; native of Germany; housewife; residence, Adams, Mass. Patient well as a girl; first menstruated at 19; always healthy; has had ten children. Present trouble began seven years ago; at that time the menopause occurred. About three years ago she began to increase, most noticeably about the waist; last summer she experienced pain in the abdomen for first time. Appetite good, bowels regular. Admitted to Albany Hospital December 8, 1889. After careful examination, diagnosis made of ovarian cyst, with probable adhesions, due to the local peritonitis she had evidently had. Operation was decided upon and incision made December 9 in the usual manner; but the cyst was found thoroughly adherent to the parietal peritoneum and to the omentum and large intestines to that extent that it was impossible to remove it. The cyst was stitched into the abdominal wall by continuous sutures, patient making a good recovery. After continuous drainage for about ten weeks, the sinus remained permanently closed, and she recovered her health sufficiently to return to her household duties. This patient remained well up to January, 1893, when she again began to enlarge, and now presents with a cyst about one-half the size of the former one. I am of the impression that the other ovary has taken on a development of cystic tumor, and that we have here an embarrassing situation as to whether it will be possible to remove it even if it possesses no adhesions of its own.

Case 4.—Presents a condition bearing more particularly upon this paper, that of Mrs. J. McD., married; mother of several children; a patient of Dr. H. E. Mereness, of Albany, and who gave a history of an abdominal tumor of more than three years'

growth. She was a very fleshy woman and it was exceedingly difficult to make out the diagnosis; yet, from the history, it was believed she was suffering from either a fibrocystic or a multilocular ovarian tumor. Owing to pressure against the diaphragm, to obstruction of the bowels, and to edema of the lower extremities it was decided to operate. January 10, 1892, the operation was done. We found a thick cyst wall with three large cavities, containing a brownish-looking fluid, thick in character, like that which we not infrequently get from multilocular ovarian cysts, and on breaking down the partitions I was able to evacuate the contents so as to bring the abdomen down to about its normal size; but I found the most extensive and serious adhesions possible. The large intestines were severely implicated, as were also portions of the abdominal parietes, and when drawn upon dented the external appearance of the abdominal wall. With my hand I cleaned out the contents of the cysts as thoroughly as possible, breaking down partitions, brought the edges of the cyst well up into the abdominal wound, stitched with continuous suture, placed in two glass drainage tubes, washed out thoroughly with a solution of mercuric bichloride at times, occasionally using carbolic acid; but mostly a solution of boric acid—continued drainage, and in good season had the satisfaction of seeing this patient make a complete recovery, although she was under the careful treatment of Dr. Mereness and myself for a period of between three or four months. She is now well and in every way able to attend to her household duties.

I am certain that had we gone on and prolonged the operation that this patient would have been placed in serious jeopardy as to her recovery, and I feel that it would have really been impossible to have detached the adhesions.

Case 5.—Mrs. N. O.; aged 62; housewife by occupation; under the care of Dr. Barry, of Schenectady; admitted to Albany Hospital November 11, 1892; married; mother of four children; menopause at 50; no unusual personal or family history. Says she did not notice any enlargement of the abdomen until one year ago, when she began to increase quite rapidly; has not suffered any particular pain; appetite very good; some bladder irritation, but the bowels have behaved well. For the past two or three years she has frequently been joked by her friends as to her growing fleshy. Examination of the urine shows the kidneys to be in a healthy condition; no swelling or edema of lower extremities. Pulse about 80, but slight rise in temperature. Operation November 12, 1892, believing the case to be one of multilocular ovarian cyst. On entering the sac I drew off nearly 3 quarts of purulent-looking fluid. There were no pelvic adhesions and I had no difficulty in reaching a fairly good pedicle associated with the left ovary, but on passing my hand up along the cyst wall, on each side, and attempting to reach to the superior surfaces of the cyst, I found the adhesions so serious and so firmly attached to the transverse colon as to make it soon evident it would be impossible to loosen them with any degree of safety. I therefore emptied the cyst walls thoroughly well, it really being a multilocular ovarian cyst, closed the openings in the sac, reached the pedicle, ligated it in two places, made a section between the double ligatures, drew the lower portion of the cyst wall well up into the incision, stitched carefully to the abdominal wound, reöpened what was left of the cyst, cleaned out thoroughly, placed a glass drainage tube down in the cavity of the pelvis (it draining quite successfully for three or four days, and was then removed); also placed two glass drainage tubes, packing well around them with iodoform ganze, in the remaining portion of the cyst wall, and then continued thorough drainage afterwards.

This patient made a good recovery, and is now able to get out and about, enjoying life with much comfort, a great joy to her anxious children.

Case 6.—Mrs. C. M.; aged 37; married; housewife by occupation; came under my observation April 20, 1893, with the following history: Sister died of phthisis at about the age of 30; otherwise family history good. Patient never strong; has had 6 children; no miscarriages; always regular in menstruating. Seventeen months ago had pleurisy, with effusion of the left side; was aspirated by Dr. Macdonald, of Schenectady, and, as she said, a large amount of fluid removed. From this she made a good recovery, but about this time she noticed an enlargement of the abdomen. In February, 1893, the abdomen was aspirated and about 3 quarts of fluid removed. Examination reveals a well-defined tumor in the right side of the abdomen, filling the pelvis and extending up above the umbilicus, fluctuates somewhat distinctly; but gives a sensation of being held firmly in position. Diagnosis was made of tubercular peritonitis, with fluid, probably held in pockets by adhesions between folds of intestines. Since her last aspiration she has gradually filled, and has lost in strength until now her general health is somewhat seriously affected. Exploratory incision advised, to be followed by permanent drainage. Section made May 3, 1893. Quite an amount of ascitic fluid was removed and then an ovarian cyst connected with the right ovary, holding nearly a quart of fluid, was discovered. Here the adhesions to the cæcum and the sheath of the iliac vessels, on the right side, were so

firm, with adhesions to the transverse colon and stomach, which were brought down below the umbilicus, that I could do but one thing, and that was to bring the cyst walls up into the incision, stitch and drain. Drainage was carried out successfully, and patient has made a good recovery.

Case 7.—Mrs. L. Y.; aged 50; housewife; referred to me by Dr. Moon, of East Springfield, N. Y. Family history exceedingly good; thorough absence of any malignancy, or tubercular disease; both father and mother still living and in fairly good health. First menstruated at 11 and has always been regular. Married at the age of 24; never pregnant. Ceased to menstruate at the age of 40. When 18 years of age was thrown from a horse and thinks she was never quite as well afterward. Had scarlet fever when 23 years of age. Fifteen years ago she suffered some pelvic distress and consulted Dr. Thomas A. Emmett, of New York City, who gave her the diagnosis of fibroid tumor of the uterus and advised her to let it alone. Eight years ago was thrown from a wagon, striking upon her buttocks and receiving a severe jar. Was weak for a long time afterwards, feeling much soreness in what she supposed to be the fibroid; however, remained in very good health up to December, 1892, when she noticed an enlargement of the abdomen, low down and on the left side. March, 1893, this had increased very decidedly. About the 1st of June she had very severe attacks of pain for three days and nights, suffering a great deal, and has since had several such attacks; but thinks they have gradually decreased in severity. She says the growth has enlarged very slowly since she first discovered it. Has suffered much inconvenience from constipation, more especially since noticing this last enlargement. I saw her August 1, 1893; was able to locate a fibroid tumor on the right side of the pelvis, low down, and about the size of a goose egg. The uterus was drawn up to the left; the broad ligament on that side seemed contracted, and the uterus fixed at that point. Above the symphisis and extending close up to the xyphoid cartilage, filling the lumbar regions thoroughly, could be made out a fluctuating tumor, evidently ovarian in character.

I advised an immediate operation, in view of her general emaciation, her inability to take much food, pressure upon the kidneys, and other important organs being such as to give her great inconvenience and distress. She had remembered thoroughly well Dr. Emmett's advice and was reluctant to have any operative interference, but when the case was fully explained she seemed more willing. She was detained in various ways and did not enter the Albany Hospital until August 29, 1893. After proper preparation operation was performed the next day, the 30th. I had anticipated meeting with adhesions, her history being in that direction. Had no trouble in exposing the sac and emptying its contents, a brownish-looking fluid; but found, as I withdrew about two-thirds of the sac that it was firmly adherent to the rectum, including sigmoid flexure, dipping down into the pelvis on the left side and also adherent to the subperitoneal fibroid, which had its relation in connection with the right cornu of the uterus. After thorough examination I found that it would be more than dangerous to attempt to dissect the sac, which was held so firmly by strong adhesions. I therefore stitched the deeper portions of the sac to the abdominal incision, removed that portion which was free, emptied the remaining part thoroughly, being in size not more than would hold a pint, placed in gauze drainage, also a glass drainage tube to the deepest portion, operation not being a prolonged one. Patient has gone on uninterruptedly with a train of satisfactory symptoms, doing as well as could be desired.

I am fully aware that every operator must, at the time of operating, be the judge as to how far he may go in the removal of tumors associated with strong adhesions. In view of the very excellent system of drainage that can now be employed; in view of the impression that prevails among the friends of the patients that they ought not to die upon the table, or from the immediate effect of shock, only in very rare instances, I am prone to believe that we should be somewhat conservative in our course in these cases; yet I am frank to admit that it is much more pleasing to the operator, much more a test of surgical skill, perhaps, to remove all that which he attacked as a pathologic condition, and bring his patient into as normal a state as possible. In carrying out drainage in these cases the patient should be put in care only of a conscientious, judicious nurse. A glass drainage tube should be employed and made to reach to the deepest portion of the cyst, or whatever remains of the cyst walls and adhesions. A rubber drainage tube can not be relied upon at first. Gauze packing is much preferable to the latter. We are bound to respect pelvic adhesions when they implicate the sheath of important vessels resting there, and gauze drainage is the safest. Deep-seated pelvic hæmorrhage is not always so easily controlled, and has troubled more than one operator when he

has encountered it. No one will deny but that abdominal incisions can certainly be treated with a greater degree of comfort than where the large intestines are implicated.

We have seen much in days gone by as to the use of the thermo-cautery and preparations of iron in controlling hæmorrhage resulting from the breaking up of adhesions, and yet I would like to get the honest expression from the operators of to-day as to how often these two agents are made use of. Ligatures and drainage tube, in one form or another, beyond a doubt are the best agents we have for controlling hæmorrhage in these cases where we are obliged to separate extensive adhesions. I am not unmindful of sapræmia and septic conditions in cases of incomplete removal of the sac and I do not want to convey the impression that I would in the least surrender any case that it is possible to make a complete operation in. I am fully aware that drainage carries with it some uncertainty, especially in the effort to get consolidation by collapse of the walls of the sac and where the detritis is to be removed in larger portions from time to time. I would advocate this line of treatment only in such desperate cases as where we feel our patient is likely to be carried beyond the point of possible recovery, and to die in shock, because of the too severe tax made upon the weakened vitality of the system. These cases of drainage require the utmost care and watching as to general treatment; diet, sanitary surroundings, all becomes of the greatest importance where the necessity of drainage is the only method of procedure.

DISCUSSION.

Dr. Andrew F. Currier, of New York, said:

The paper just read, I am sure, Mr. President, has been very instructive to all of us. It is directly in line with the one which preceded it, both admonishing us to examine our cases more carefully before operating. I have done a large series of operations without mishap, but this success is likely to create a feeling of false confidence which makes a man think he can master any situation which presents itself, and in this way he is likely to do his patient an injustice, and may be awakened rather rudely from his delusion by the death of his patient when her condition did not seem so severe as to lead him to expect such a termination. If this meeting does nothing more than to charge us to look to our cases with more care and thoroughness before operating, it will have accomplished much. In considering the question at issue, the treatment of adhesions in the abdominal cavity, there are two classes of cases: One where it is necessary to remove the adhesions under any and all circumstances; the other, where they may be left. Adhesions which interfere with the normal peristaltic action of the intestines must be removed at any cost. But there is also a large class of cases in which it is unwise to break up the adhesions. If we apply the suggestion I made, which is practically that the object of the operation is to save our patient, we will not be so anxious to clear away all adhesions, but simply to do that which will offer the patient the best chances of recovery. Therefore, in considering the advisability of operating upon a woman with adhesions, the probable chances she has of surviving the operation should chiefly influence us. The suggestion made by Dr. Cushing that we can not tell, in very many instances, whether a patient is septic or not, must be weighed carefully. In some cases an operation, no matter how simple, may prove unfavorable, so that the statement made at the beginning of these remarks again comes into force, that it is the condition of the patient which we should all ascertain before determining to operate.

Dr. Charles P. Noble, of Philadelphia, Pa., said:

Mr. Chairman: I agree entirely with the writer of the paper that it is sometimes wise to stop and not finish an operation. Several deaths from persisting with the operation have taught me the wisdom of letting well enough alone. It may be that we are influenced by the teaching of Schroeder and Olshausen that it is wise to

remove everything, but I am convinced that there are circumstances when it would be unwise to do so. When we have papillary cysts, which can be gotten out only with alarming hæmorrhage, they should not be removed. I recently operated on a patient when not only did I not take out the tumor, but I believe she would have died had I persisted in doing so. In one case that I recall the contents of the sac were bland and the patient was in good condition. I found the tumor adhering to or, rather, incorporated with, everything from the bottom of the pelvis to the epigastrium and I did not want to interfere with it. In another case on which I operated the papillary cyst had many adhesions and numerous sacs. She was greatly reduced from sepsis, due to suppuration in the tumor. She recovered from the immediate operation; but died some weeks afterwards. I think it best to abandon the operation rather than have a death on the table. It is the adhesions to the bowels and mesentery that are bad, but when the adhesions are in the pelvis we can always get them out. When the case is a malignant one I think it is wise to hold off if the condition is bad. Another class of cases in which it is wise to refrain from interfering is where the bowels are pushed up by the tumor and are around the diaphragm. I have never had such a case, but I am confident that they always die, no matter how you treat them, because the bowels do not adjust themselves to the new condition of things.

Dr. A. Lapthorn Smith, of Montreal, Canada, said:

Mr. Chairman: The author, in his paper, has asked the section to give him the result of their efforts to stop hæmorrhage by the use of the cautery and the use of iron I can give him some information on one of these points. I have used the Paquelin thermo-cautery to stop bleeding on the surface of the intestine and the hæmorrhage was promptly arrested. Some time afterwards I again opened the patients abdomen to remove another cyst and I had an opportunity to examine the place where I had touched the intestine with the cautery, and I found dense adhesions at that point. I think the profession should stop using these two methods. I was very glad to hear Dr. Vanderveer utter this word of caution against attempting to break up adhesions to the great peril of the patient. Anyone who goes on with an operation for four hours subjects his patient to a risk which is almost criminal. I think if an operation can not be done in one hour, or a little over, it is better to stop then and give the patient a chance. Once, while attempting to do an operation where all the abdominal structures were bound down by a mass of adhesions, I found myself going deeper and deeper into the mire, when I stopped the operation. The woman is now well.

Dr. I. S. Stone, of Washington, D. C., said:

Mr. President: Such a case as the one related by Dr. Vanderveer occurred in this city a short time ago. The abdomen was opened and everything found in one conglomerate mass, with the intestines growing all around a tumor. The operation was postponed and the woman got well. In such cases I think it is better to accept the dictum: "Do not operate for four hours" If Dr. Vanderveer can not finish an operation in four hours, there is no chance for many of us.

Dr. Vanderveer, in closing the discussion, said:

I will take up the time of the section, Mr. President, for but a moment. Dr. Currier brings out a point I wish to emphasize, viz: That adhesions to the small intestines should be loosened at all hazards. Speaking of conditions where we have pus, we should go as far as we can with safety and leave as little there as possible. Dr. Noble has touched on pus sacs in the same way. It is wonderful how patients with papillomatous growths will get well after rough handling. I am glad to hear Dr. Smith give his opinion in regard to the use of the cautery and iron in checking hæmorrhage from the intestines. The text books now advise sponging for slight bleeding, and the thermo-cautery and iron in profuse hæmorrhage. I have never used the thermo-cautery, as I consider it dangerous, and Dr. Smith has warned us about the adhesions he found. I believe the use of iron equally injurious.

THE AFTER-TREATMENT OF CŒLIOTOMY CASES, WITH SPECIAL REFERENCE TO SHOCK AND SEPTIC PERITONITIS.

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I shall offer no apology for bringing before this body a subject so frequently discussed, as its importance is always its excuse.

There are three post-operative conditions, which, by reason of their serious nature, call for prompt and intelligent action on the part of the attending surgeon. These are (1) secondary hæmorrhage, (2) shock, and (3) septic peritonitis.

The question of secondary hæmorrhage I shall dismiss briefly, not because it is of less importance; but because its treatment should be mainly preventive and consists of careful, certain securing of all possible sources of hæmorrhage at the time of operation. But as an additional preventive measure, and one whose importance is sometimes underestimated, continuous, watchful care must be exercised to prevent sudden movements on the part of the patient, or turning or tossing during the first few hours following the operation. The reasonableness of this measure is apparent to all of you and needs only to be mentioned. If hæmorrhage does occur the only remedy is to reöpen the wound and re-tie the bleeding artery, if the condition of the patient will admit. If not, secure it by clamps, close the wound as securely as circumstances will admit, and wait for reaction. In many cases, however, it will be advisable, before reöpening the wound to transfuse into a vein one or two pints of normal salt solution. By this measure almost no time will be lost, and the best possible chance given to the patient.

Apart from secondary hæmorrhage, the most frequent and formidable of the early post-operative complications is shock. Its importance your own experience will attest, as instances of its fatality too easily recall themselves to your memories. It will not be possible to discuss its treatment intelligently without reviewing very briefly its etiology and pathology. Authorities almost without exception have pronounced it paresis of some part of the nervous system, but the unsatisfactoriness of such pathology is evinced by the variety of opinions expressed; some pronouncing it a general paresis of the vasomotor system, others a paresis of the entire sympathetic system, while others limit it to a paresis of the abdominal vasomotors. Opinions are thus diverse because no one of these theories will satisfactorily explain all the constant symptoms. But that it can not be cardiac and arterial spasm, but must rather be some form of vasomotor paresis, is thought to be proven by the fact that arterial tension is invariably low. This one fact seems to possess more importance than the combined weight of all the other symptoms. On account of the limited time at my disposal on this occasion, I will refer you for a full discussion of the pathology of shock as related to individual symptoms, to a paper read by me before the American Association of Obstetricians and Gynecologists at its meeting in June last. But I must be allowed to quote from the Manual of Human Physiology, of Landois & Stirling, to show that low arterial tension is not incompatible with strong stimulation of the cardiac nerves. On page 106, in speaking of cardiac stimulation and of the action of electricity, they say: "A constant electrical stimulant of moderate strength increases the number of heart beats." Also: "If the constant current be very strong the cardiac muscle assumes a condition resembling, but not identical with, tetanus (Ludwig & Hoffa), and of course this results in a fall of blood pressure. (S. Mayer.)"

Now this is precisely as I believe, the primary condition in shock, namely, a strong, constant irritation (or stimulation) of the entire sympathetic system. And to show, as briefly as possible, that such a view is not only not incompatible with the symptoms but is rather a necessary conclusion from a consideration of them in their entirety, I will quote the conclusions expressed in my paper above referred:

Shock is not a general paresis of the sympathetic nervous system, because (1)

the entire arterial system is *contracted* rather than *dilated;* and (2) the skin is moist or bathed in perspiration by reason of the irritation of the secretory fibers of the sweat glands instead of dry, as it would be in pallor of the skin, low temperature, and paresis of sympathetic fibres. It is not a paresis of the cardiac nerves and ganglia, because (1) the heart's action would be slow by reason of the preponderance of the inhibitory influence of the pneumogastrics; (2) it is not probable that cardiac branches of the cervical sympathetic would be paretic while other branches were abnormally stimulated, and in shock the pupils are widely dilated by reason of the stimulation of the pupillary branch of the cervical sympathetic. It is not a paresis of the vasomotor nerves of the abdominal vessels, because (1) paresis of these nerves would cause dilatation of the abdominal arteries. Dilatation of the renal artery would cause polyuria, even if accompanied by dilatation of the other abdominal vessels. In shock the secretion of urine is scanty, or even suppressed; (2) dilatation of abdominal arterioles would cause decreased peristalsis. In shock, peristalsis is often increased.

On the other hand, it is hyper-irritation of the entire sympathetic system, because

(1) The skin is pale and livid by reason of contraction of the arterioles because of stimulation of their vasomotor nerves.

(2) The heart's action is rapid by reason of stimulation of its sympathetic nerve supply.

(3) There is scanty secretion of urine by reason of contraction of the renal arteries; the result of stimulation of their nerve supply.

(4) The skin, though pale and livid, is bathed in perspiration by reason of stimulation of the secretory nerves of the glands.

(5) The pupils are dilated by reason of stimulation of their sympathetic nerve supply.

(6) The pulse at the wrist, while rapid and small, as would be expected in vasomotor stimulation, is soft and very compressible by reason of the very scanty relaxation or dilatation of the heart (the same condition into which it is thrown by strong electrical stimulation of its nerve fibers, as shown experimentally).

(7) This condition of the heart may not have been actually demonstrated (as existing in shock), but may justly be inferred by analogy, reasoning from the action of the uterus under similar conditions. Each contraction of the uterus is normally followed by a period of perfect relaxation, as is the heart. Over irritation or stimulation of the uterine ganglia, or sympathetic nerve supply, causes rapid contractions with very imperfect relaxation. It is fair to infer the same condition in the heart under similar causation. Thus the supply of blood thrown into the arteries is scanty and blood pressure is low.

(8) The first five of these conclusions are justified by well-known experimental demonstration. The 6th and 7th are fair conclusions by reasoning from analogy.

(9) That the condition of the heart is one of stimulation rather than paresis, may be considered demonstrated by the fact that in cases of sudden death from severe shock the heart has been found contracted and empty.

From these facts I feel justified in concluding that the primary condition in shock is in no sense a paresis, but is rather a severe irritation of the entire sympathetic system. I say that such is the pathology of the early periods of shock, but I am willing to admit that after a variable period the entire condition may change without any perceptible change in the symptoms. All muscular tissue tires after a period of unusual activity. This is true of involuntary muscle equally with voluntary. And though the nerve impulse continues irritant in nature the heart muscle is weakened and can not contract with normal vigor. The arterial spasm is at the same time less violent. The frequency of the heart beat may continue the same, but the size of the blood current will not be increased. The conditions which exist during and after a celiotomy, which are productive of shock, certainly would seem to be such as would give rise to an impulse of irritation rather than of paresis; for

instance, the compression of nerve fibers by the ligature, the severe manipulation of the intestines, the forcible separation of adhesions whereby the peritoneum always suffers more or less violence—all are extremely irritant in nature. While in all cases the nerve impulse is irritant, and equally in all cases the primary condition is one of cardiac and arterial spasm (if I may so term it), its duration, in point of time, is extremely variable. All conditions which tend to weaken the heart before operation tend to shorten the first stage of shock. Such are lack of nutrition, exhausting discharges, and especially long-continued septic infection. In such cases the condition of cardiac and arterial spasm will soon, by reason of "muscle tire," give place to weak and inefficient contraction. This fact must be kept in mind in all cases, as the treatment of the two conditions is very dissimilar.

Shock usually manifests itself before the patient is removed from the operating table. It is usually comparatively sudden in its onset, and may prove rapidly fatal. When first noticed the patient's head should be lowered and nitrite of amyl freely administered, with, if you please, hypodermics of nitroglycerin. The patient should be placed in a dry, warm bed and surrounded by hot-water bottles. The surface should be kept as dry as possible to prevent unnecessary chilling by evaporation. Bearing in mind that the condition is one of extreme sympathetic irritation, our remedies should be such as are directly sedative. Chief among these is some preparation of opium. On account of its freedom from nauseating effects, I prefer codeine, of which I administer at least one grain hypodermically as soon as the patient is placed in bed and repeat in two, three, or four hours if necessary. I am aware that many of our most experienced operators condemn without qualification the administration of any form of opium at any time after a cœliotomy, but I can see no logical grounds for such condemnation. I know that it is claimed that its use checks secretions, stops peristalsis, and "masks symptoms;" yet in the first hours of shock we wish such a remedy; one that will check profuse perspiration, quiet painful and irregular peristalsis, and relieve the vasomotor irritation that causes cardiac and arterial spasm. There are no symptoms at this early stage that should not be "masked." The abdominal pain which generally is caused by spasmodic and irregular contraction of the muscular coats of the intestines serves no good purpose. Yet some say that pain after a cœliotomy is "healthful." Why is it healthful? What good purpose does it serve? The only excuse that has any degree of plausibility is that constant peristaltic action of the intestines may prevent the formation of adhesions, and this is an assumption not easily proven. But I shall speak of the use of codeine again when discussing the production of catharsis. In addition to codeine, I advocate the free use of hypodermic injections of nitroglycerin, beginning with one-fiftieth of a grain, as often as indicated. Its mode of action, relaxing arterial spasm, is so well understood now that I need only mention it. These two drugs, codeine and nitroglycerin with nitrite of amyl if necessary, fulfill the indications, as far as medication is concerned, for the first few hours. But there is one other remedy which I consider of great importance in cases of severe shock, and that is hot water. It must be used freely, either by injection into the colon or by transfusion into a vein. What are the indications for it? First, to relieve the thirst which is often so distressing after cœliotomy, even when there has been almost no loss of blood; and, second, to replenish the blood vessels. After an abdominal section, when there has been prolonged or severe manipulation within the abdominal cavity, there is invariably a free outpouring of serum. If, in addition to this, there occurs the profuse perspiration of profound shock, the loss of fluid from the system is rapid and excessive, and must be artificially replaced if you would preserve life. For such purpose repeated injections of from a pint to a quart of water through the long tube into the colon fulfill every indication. It is absorbed with great rapidity and manifests its beneficial influence by increasing the volume and lessening the frequency of the pulse. But in shock it is not enough that water should be used. It should be as hot as can be borne by the patient, because it is not only more rapidly absorbed, but the

soothing effect of the moist heat on the irritated abdominal plexuses is marked and tends greatly to relieve those conditions, the manifestation of which is shock.

But if these phenomena continue to what I have denominated the second stage, where cardiac and arterial spasm are replaced by cardiac weakness by reason of "muscle tire," hot water may be injected directly into the vein with great advantage. It acts more promptly and powerfully and with greater certainty than when injected into the colon. Here also our medication must be different. I now rely on the free hypodermic use of strychnine, digitalis, and other cardiac stimulants. It is in this stage that the flagging powers must be stimulated and these medicines used in no hesitating way. They may be given in doses so large as to be alarming under ordinary circumstances, and yet produce none but good results. This course of treatment promises better results, to my mind, than any other, and is logical.

After recovery from shock, the next great danger to be met and overcome is peritonitis. Whether the theory promulgated by Mr. Lawson Tait, that peritonitis is due to a disturbance of the innervation of the peritoneum rather than to sepsis, be correct or not, all will agree that after death from post-operative septicæmia, evidences of peritonitis are almost invariably found; and our instinctive feeling is that if we can prevent infection, we need not fear peritonitis. With that class of cases where the infection is introduced into the abdominal cavity at the time of operation, I shall not attempt to deal, as the expectation is that all who operate take such precautions against septic infection that it may be excluded as a possible factor in any case. But unfortunately there is a large class of cases where, from the nature of the fluids removed from the abdomen or pelvis, septic infection is a most imminent danger. In such cases the most important part of the treatment is preventive, and must be attended to at the time of operation. In all such cases drainage by tube or gauze is proper. I will not say imperative, as the experience of many of you would contradict the term. But in the post-operative treatment of threatening sepsis (or peritonitis), before it has become firmly established, nothing is better than free catharsis, and among drugs none are better than the salts of magnesia for this purpose, provided always that the stomach will tolerate them. They are better than others because they have no irritating action, do not stimulate the glands especially, but act directly by osmosis, unloading the blood vessels of serum and causing them to replenish themselves from the fluid in the peritoneal cavity, thus promoting absorption and drainage. But if for any reason salines cannot be used, nothing in my experience is better than calomel. While we all unite in the desirability of early catharsis in these threatening cases, we may not all agree as to when it should be undertaken nor as to the best means of promoting it. There are several factors influencing peristalsis after abdominal operations that it will be well to keep in mind.

Peristalsis is normally produced by the stimulus received by Auerbach's plexus (situated in the muscular coat of the intestines) directly from the contents of the canal, or through the sympathetic nerves from which this plexus is formed. It is also modified by the vascular condition; that is, contraction of arterioles, by which venous blood becomes in excess, stimulates peristalsis; dilatation of arterioles, on the other hand, decreases it. Again, in order to the free, easy production of liquid movements, it is necessary that the blood vessels be comparatively well filled. For instance, it is well known that salines, which act principally by osmosis, act with difficulty or not at all if fluids have been withheld for two or three days previously. What now is the condition of the intestines, after most cœliotomies? In ordinary uncomplicated cases, where there has not been much irritation of the abdominal or pelvic contents, there will generally be no difficulty about producing catharsis after thirty-six or forty-eight hours. But in those cases where the dissection of tumors, etc., has been difficult and prolonged; where there has been severe manipulation of the intestines, with perhaps direct and intense irritation of ganglia and plexuses, there is generally a more or less severe irritation of the

intestines. This manifests itself by paroxysmal pains, often extremely severe, which are caused by spasmodic and irregular peristalsis. Autopsies in cases dying with symptoms of intestinal obstruction, according to Ashton, have shown a tetanically contracted portion of intestine with dilated intestine above it.* This occurs by reason of severe irritation of the sympathetic nerves supplying that portion of intestine, by which it is thrown into a condition of tonic spasm. And this condition exists in a modified degree after all severe cœliotomies. I do not mean that tonic spasm of the bowel always exists, but that it may occur oftener than is known, and that there is *always* over-irritation of the motor nerves of the intestines, causing irregular, obstructive peristalsis. If at this time stimulating cathartics are given, the only result will be that fuel will be added to the fire and reverse peristalsis be produced because normal downward peristalsis can not be established. In this way is to be explained the difficulty so frequently met with in early effort to move the bowels. The indication then is to severely abstain from everything that tends to *stimulate* peristalsis, until by the subsidence of the pain or the natural escape of flatus, we can perceive that normal peristalsis is reëstablished, and the conditions are favorable for gentle, unirritating catharsis. If this abnormal activity of the intestines be severe or prolonged, great benefit will be obtained by the early hypodermic administration of a free dose of codeine. It not only relieves pain and quiets the patient, but it relaxes intestinal spasm and allows the reëstablishment of normal, painless peristalsis. In this way it is an aid to catharsis rather than a check. It is a benefit and blessing to the patient and in no sense an injury. Again, in the early hours following an abdominal section, the flow of liquid is toward the peritoneal cavity. There is always a marked effusion of serum, sometimes very great. This depletes the intestinal blood vessels, and in this way renders the production of catharsis much more difficult. Much will be gained, therefore, by waiting until this current is checked and the blood vessels have been given time to replenish themselves from the fluid in the tissues. Even then it will be of benefit to precede the administration of salines by a rectal injection, through the long tube, of at least half a pint of hot water, which will be rapidly absorbed by the thirsty vessels. Then the introduction of a concentrated solution of sulphate of magnesia will easily establish the flow of fluid toward the intestinal canal and promote the rapid absorption of the fluid present in the peritoneal cavity. Thus good intestinal drainage is established; the effusion of serum into the cavity is checked, the culture medium of pyogenic germs is removed, and septic peritonitis is prevented.

The question of drainage, either by tube or gauze, I shall not have time in this paper to discuss. Theoretically, it is, in such cases, desirable; practically, each operator is governed by his own personal experience.

If septic peritonitis is fairly established, the forlorn hope is to reöpen the cavity, thoroughly flush, and establish free and complete drainage, both through the wound and the intestinal canal. It will be difficult to establish intestinal drainage, because of the overdistention of the muscular coat by imprisoned gases. To remedy this and thus allow the muscular fibers to regain tone, a free incision into the intestines (as recently recommended by Dr. Henrotin, of Chicago), with, perhaps, the establishment of a temporary artificial anus, will be good surgery, and may be the factor by which the question between life and death will be decided.

DISCUSSION.

Dr. Ernest W. Cushing, of Boston, Mass., said:

Mr. CHAIRMAN: We all have to thank Dr. Boise for his very interesting and instructive paper. It has often seemed to me, when the zeal for novelties was so

* Ashton, in paper on intestinal obstruction read before Am. Med. Ass'n, 1892.

rampant, that we were getting ahead with new theories faster than we could put them into practice; but here is a practical thing which has been in existence since Cain killed Abel. I am pursuaded of the value of the suggestions made by Dr. Boise and the treatment recommended by him, especially that in regard to getting hot water into the patient by simply putting it under the skin and also in regard to the use of opium in treating a patient for shock. We are all under the fear of Mr. Tait in regard to giving patients opium, but we have all seen cases where a small dose of opium, hypodermically, does wonders. In regard to the obstruction of the bowels after an operation, that is a deep question which I have long pondered over, and I am no nearer a conclusion now than I was at first. What is the cause? I do not know. We have all seen cases of fibroid tumor where everything has come out very nicely and without trouble, and yet that patient has obstruction of the bowels and will die of sepsis. That patient has no right to die at all. Take another case, on the other hand, where you have to dig around in the pelvis after pus tubes, cystic ovaries, etc.; you may have no rise of temperature, no obstruction of the bowels followed by sepsis, and the patient will get well. Why this should be is more than I can explain.

Dr. Tuck, of Cambridge, Mass., said:

Mr. President: I would like to make a few remarks. This paper which we have just heard brings us down to the hard pan of practical work. When we are considering the subjects of shock and sepsis we are considering practical questions, leaving theory out of the question. In discussing sepsis and the condition of the bowels following operations, I think a great deal depends on the individual patient we are dealing with. In civilized countries shock is our greatest dread. In preparing a patient for an operation an important thing to be considered is the care of the intestines. Obstruction of the bowels is due, in many cases, to paralysis of the intestines following cœliotomy. If we have any food or foreign substance in the intestinal canal there will be flatus and tympanites and to overcome that condition we give salts. We will accomplish more if we give the salts beforehand, but most operators do not go far enough in this direction. We should make it a habit to thoroughly clean out the intestines before beginning an operation. We may give a dose of salts every hour; but we must do more than that to make the intestinal tract aseptic. The best thing to do is to start in with drugs which act on the upper intestines, and follow this up with drugs acting on the lower portion of the canal. On the first day it is my habit to give calomel, and follow it up with salts.

Another thing to guard against is sepsis. This may be due to the formation of a cardiac thrombus. To avoid that accident we may throw in our stimulating material by transfusion. When we are operating we should have a bag filled with saline transfusion material, combined with a stimulant, close at hand, and when necessary this can be thrown into the system through a needle inserted into the abdominal wall. I find that when I am operating it is a simple matter to insert the needle and throw in enough transfusion material to form a tumor about the size of an orange, which will counteract all tendency to shock.

Dr. Charles P. Noble, of Philadelphia, Pa.

Mr. President: The question of shock and sepsis is a most interesting and instructive one, and I have taken great interest in the paper of Dr. Boise, because he has presented the subject in a way differing from that in which I have heretofore considered it from a physiological standpoint. I have always regarded it as a condition of depression of the system, whereas Dr. Boise considers it as a state of depression due to overstimulation. Let us go on to a consideration of the practical aspects of the treatment of shock. The best way to treat shock is to prevent it by having our patient in good condition and by selecting a date for the operation and directing our energies to the task of getting the patient in condition for several days or weeks. Considering the immediate measures to be adopted during the operation for the prevention of shock, the temperature of the operating room should be between 75° and

85° F., and good warm blankets should be wrapped around the legs and body of the patient. Avoidance of wet towels around the patient is of prime importance, and the habit of some operators of putting towels wrung out of antiseptic solutions around patients can not be too severely condemned, for they help to refrigerate the patients through evaporation. Leaving out of consideration the subject of prevention, which is a most important one, and going on to the question of cure, I have not followed the plan laid down by Dr. Boise. I have used amyl nitrite and nitroglycerin. I have used strychnine in large doses, and the more I use it the more I like it. It adds to the capacity of the heart to do its work and stimulates the nervous system, thereby militating against Dr. Boise's position. I have had case after case where I thought the use of strychnine saved the life of the patient. I have never used less than one-fifteenth of a grain and I repeat this in three or four hours without any bad symptoms. When the patient is in a bad condition I have used one-fifth of a grain. I have found that we can use ten times as much strychnine as we learned from our teachers. Ten years ago I taught that small doses of opium were good for shock and I have had no cause to regret it. Artificial heat and keeping the patient dry are methods practiced by all operators. The use of dry friction with the hands keeps the patient dry, and is a procedure of great importance. I have not resorted, myself, to the practice of putting water under the skin, but it is my intention to do so, and I am very glad to hear such favorable reports on that method.

Dr. Robert T. Morris, of New York, said:

I am sorry, Mr. President, that Dr. Boise did not include in his paper one point usually overlooked. It has been found by experiment that if we use chemical antiseptics or common water to flush out the abdominal cavity we injure the serosa, and the lymphatics opening into the serosa are thus temporarily closed. We all know how a specimen of a rat's tail put in common water for one hour will become injured as a specimen, but in normal saline solution it retains a normal appearance. Normal saline solution is the only thing we can use in the abdominal cavity with safety, but the profession is very slow to realize that point.

Dr. J. H. Carstens, of Detroit, Mich., said:

There is one thing, Mr. President, which has not been mentioned by Dr. Boise, nor by any of the previous speakers and that is, that when you have paralysis of the intestines and can not get the bowels to move, the administration of fifteen or twenty drops of turpentine every hour will do much good.

Dr. Boise, in closing the discussion, said:

MR. PRESIDENT: I have very little to add to what has already been said, but I would state, in speaking of what Dr. Noble lays so much stress on; the use of strychnine, that I also use it, but not in the stage immediately following the operation. If the arterioles are contracted it is because they are stimulated, but paralysis of the vaso-motor nerves causes dilatation of the blood vessels. I was careful to avoid, in my remarks, all question of the prevention of shock, and to confine myself to the conditions already existing after operations.

AN INQUIRY INTO THE ETIOLOGY OF MENTAL DISTURBANCES FOLLOWING OPERATIONS UPON THE FEMALE PELVIC ORGANS.

By GEORGE H. ROHÉ, M. D.,

President of the American Association of Obstetricians and Gynecologists, Superintendent of the Maryland Hospital for the Insane, Catonsville, Maryland, U. S. A.

The occurrence of insanity as a sequel of surgical operations has long been known. The more transitory forms of mental aberration termed traumatic or nervous delirium are recognized by all surgeons, although probably less frequently seen since the general adoption of aseptic methods in surgery. Within the past few years especial

attention has been drawn to insanity following operations upon the female generative organs and by some this occasional occurrence of mental disturbance has been held to be a contraindication to the performance of such operations. It has been claimed that insanity follows removal of the uterine appendages with especial frequency and that therefore the possibility of this unfortunate complication should demand our particular attention before subjecting a patient to operation.

Struck by the frequent more or less positive references in the recent literature to insanity following gynecologic operations and the rarity of personal contact with this condition, I ventured, a little over a year ago, to send a circular letter to the medical officers of all the institutions for the insane in the United States and British America requesting information upon this subject. Replies to this circular were received from nearly all those addressed, and to my surprise, returns of only 25 such cases occurring in the last ten years were obtained. While it is probable that some cases were missed through defective records in the institutions, it appears that some were reported as having become insane through the operation who were insane before it was done. Indeed, the histories furnished me show that in some cases the operation was done with a view of a beneficial effect upon insanity already existing. It is probable that the cases reported to me represent a large proportion of those in whom the mental aberration was of a persistent character, and included few, if any, of those transitory forms more amply characterized as delirium rather than true insanity. The further history of these 25 cases as reported to me showed that 9 were discharged from the hospitals; 7 recovered and 2 improved. Four died and 12 remained under treatment. The discharges numbered 36 per cent, the deaths 16 per cent, and the cases remaining in the hospital; some better, some stationary, some worse; 48 per cent. I shall return to the consideration of these figures presently.

The details of a number of the cases of mental disturbance following gynecologic operations leave much to be desired on the score of fullness and accuracy. In perhaps the majority of instances the reporter considers it sufficient to state that "insanity" followed the operation. However, enough is known to warrant the conclusion that several forms of mental disturbance, agreeing in the main with certain prominent clinical varieties of insanity, are met with as such post-operative sequels; but there is no special and distinctive form of post-operative psychosis. There can be little doubt that in persons with emotional instability the shock of a grave operation may produce transitory delirium, or even more persistent mental aberration. The frequency of the so-called "transitory mania" at the moment of completion of the second stage of labor is evidence that intense pain, combined with high nervous tension, is capable of producing it. The delirium attending severe injuries, "traumatic delirium," may also in most cases perhaps be ranged with the cases of mental aberration from shock. Those cases of post-operative delirium or psychosis following immediately after the operation may, I think, be classed in this category. That other factors may concur in the production of this form of psychosis, e. g., anxiety, worry, and the like, is probable. Ahlfeld reports a cases of violent mania following the introduction of a speculum, and Kiernan one consequent to the passage of a catheter in a man. In a small number of the reported cases no other essential factor than the shock and anxiety can be traced. From this form the patient as a rule recovers.

A second class of post-operative insanity would appear to be due to the absorption of poisonous agents used before, during, or after the operation. It is now generally accepted that the acute mental disturbances, mostly hallucinatory in character, following operations upon the eye, are due to the use of atropine and similiar drugs. It is not improbable that some of the post-febrile psychoses are attributable to a similar cause. I have recently had under my care, in the Maryland Hospital for the Insane, a case of acute hallucinatory mania following rheumatism, in which I believed the beginning of the attack could be traced to heavy dosing with salicylates. The withdrawal of the medicine was followed by rapid recovery. These

cases of drug poisoning with pronounced mental disturbance are probably not so very rare as sequelæ of grave surgical operations, particularly where extensive use is made of chemical antiseptics during the operation or in the after treatment. The excessive use of opium, quinine, and other anodynes and antipyretics may with good reason be charged with some of the cases of post-operative insanity. I am of the opinion that the rare cases of mental disturbance following the administration of anæsthetics may properly be ranged under the same caption. One reason for this view is that in a large majority of these cases the symptoms are transitory, and recovery promptly follows under appropriate treatment, the chief feature of which must be the withdrawal and elimination of the toxic agent.

A third class of cases of post-operative insanity I believe to be due to the absorption of septic materials from the wound or surface exposed during the operation. A study of reported cases shows that the insanity in most instances develops several days after the operation and is usually of the clinical variety termed by some writers "acute confusional insanity." The prominent symptoms are insomnia, restlessness, emotional instability, sometimes sudden violent outbreaks, followed by incoherence, variable hallucinations, especially of vision, and sometimes delusions of grandeur or persecution. In most cases there are symptoms of fever and usually marked implication of the physical powers. The pulse is rapid and weak, the temperature elevated, the tongue dry and red, and there is, usually, refusal of food. Exhaustion of mind and body rapidly intervene, and the patient sinks into a state of muttering delirium, coupled with great bodily weakness. The name "typhomania" is a fairly accurate designation for many of these cases. Essentially the condition is an exhaustion psychosis due primarily to septic intoxication or septic infection. That the affection termed by writers "acute delirium," "delirium grave," etc., is generally a septic psychosis, as maintained by Dr. J. H. Lloyd, is extremely probable. This view will explain a considerable proportion of those cases of post-operative insanity following upon gynecologic operations. Prof. Le Dentu has reported a number of cases coming under his personal observations. There were no essential differences between the acute cases following gynecologic and those following other operations. This writer collected 68 cases of post-operative insanity; 38 cases following operations upon the female sexual organs, and 30 developing subsequent to general operations.* Generally, he says, the mental disturbance begins from the second to the fifth day, although in some cases not until the twentieth, or even later. He discusses the possible causes of post-operative insanity, but does not offer a solution of the problem. Dr. Bantock, in referring to a case of "hysterical mania" following four or five days after an hysterectomy, says there was "considerable tumefaction of the mammæ to account for the disturbance." Excluding the cases due to shock, nervous strain, exhaustion, and drug intoxication, which generally appear within the first twenty-four hours, it is probable that the majority if not all the cases of post-operative insanity coming on within the first week are septic in origin.

Insanity follows operations on the eye more frequently than upon the female sexual organs. Puerperal insanity is coming to be regarded as essentially a septic psychosis and in this large and well-studied class of mental disturbances we have the closest analogy to most cases of post-operative insanity. It is possible that some of these acute cases following removal of the uterus or appendages are due to the sudden induction of the menopause, for so acute an observer as Krafft-Ebing considers the onset of the climacteric as a cause of acute delirium. I am inclined to the opinion, however, that the fourth class of cases; namely, those coming on several weeks or months after the operation and which are usually more persistent, may be attributed especially to this etiologic factor. These may be regarded as essentially cases of climacteric insanity. The clinical form in which the psychosis

*Out of 185 cases collected by Sears (Boston Medical and Surgical Journal, June 29, 1893), only 43, or 23.2 per cent, followed operations upon the uterus or ovaries.

manifests itself is the same as occurs in the majority of cases of climacteric insanity; namely, melancholia. It pursues a similar clinical course, and recovery follows in about the same percentage of cases. In about 4 per cent of all women admitted to insane hospitals the insanity is attributed to the menopause. Out of 3,047 women admitted to the State hospitals in New York during three years, 666 were between 40 and 50 years of age. If we compare the total number of cases attributed to the climacteric to the total admissions at the climacteric age, we find the proportion of climacteric insanity to all insanity in women at the same age, as 1:5. Climacteric insanity, then, is not so very rare and it should not surprise us to find a considerable number of cases among women in whom the menopause has been artificially induced. Indeed, when we consider the frequency of mental symptoms in the normal menopause, extended as it is usually over a period of several years, one is forced to expect marked psychical changes in the menopause induced by operation, where all the changes are sudden, violent, and abnormal. Kisch states expressly that psychical disturbances at the climacteric period are more likely to occur in women of excitable nervous system and in women in whom the menopause appeared suddenly.

The records of cases of insanity following operations upon the female sexual organs are neither sufficiently large or sufficiently exact to enable us to draw definite conclusions as to their actual causation. I believe, however, it would facilitate the study of the cases if they were more fully reported and if some attempts were made to classify them as in this paper.

The surgeon or gynecologist in the majority of instances simply reports that in a certain number of cases insanity, or perhaps mania or melancholia, followed his operations. The time of beginning of attack, the clinical features, the duration and termination are generally omitted as non-essential points. I am strongly inclined to the view that in the great majority of those cases of more or less persistent insanity following an operation upon the female sexual organs comprising removal of the ovaries or uterus, the cause of the insanity is the induced climacteric, and that, in most of these women, the insanity would have been developed during the menopause, whether normally or artificially produced. As a basis of this view, I call attention to the comparatively small number of cases of persistent insanity following removal of the ovaries and tubes, the clinical form of insanity present in the greater number, and finally the percentage of mental recovery which closely approximates the recovery rates from ordinary climacteric insanity.

The CHAIRMAN: You have heard this very important paper by Dr. Rohé on a subject which is considerably neglected at the present time. That operations on the sexual organs are likely to give rise to mental disturbances has been the objection raised by some persons against their performance. The chair hopes that the paper will be thoroughly discussed.

DISCUSSION.

Dr. Andrew F. Currier, of New York, said:

MR. PRESIDENT: I recall a paper read a few years ago by Dr. Thomas on the influence of operations on the female generative organs in producing mental disorders, which was the first contribution to this subject that I know of. The conclusions reached were, that operations on the female genital organs had very little bearing on the subsequent mental condition of the patient. A year afterwards a paper was read on the same subject by Dr. Baldy, of Philadelphia, before the American Gynecological Society. He had collected many cases and the proof adduced was convincing that these operations did have some bearing on the development of mental disease. These two papers, together with the one by Dr. Rohé, read before the American Medical Society last year, were very suggestive, and since hearing those papers I have had several cases, and consequently have a great interest in the subject. I have had three cases, illustrating two forms of insanity, viz, mania and

melancholia. The first case was one of mania which came on within twenty-four hours after the performance of Hegar's operation and lasted about forty-eight hours. The woman was wildly delirious. The second case concerned me deeply, as it occurred in a member of my own family on whom I operated in April of this year for fibroid tumor of the uterus. I opened the abdomen, and the question then arose as to whether the uterus should be removed or whether Hegar's operation should be done. Either would have been sufficiently easy and simple. If any of you have had the experience of operating on a member of your own family you have realized that it is better to take the least possible risk and so in this case I simply removed the tubes and ovaries. The operation was done rapidly and the patient was put to bed, and all the conditions appeared favorable for a rapid recovery. The patient had had this operation on her mind for some time, and had made up her mind that she was going to die. In that branch of the family there was a taint of insanity. For twenty-four hours before the operation she had vomited almost continuously. She became melancholy twenty-four hours after the operation. There was no evidence of sepsis. She took large quantities of food, but it seemed to produce no favorable effect, and on the sixth day she died. The general obtuseness became more and more pronounced from the first appearance of the symptoms until she died. The element of sepsis was eliminated in this case; neither could the rapid production of the menopause have been the cause.

The third case was one on whom I operated this summer. The woman was the wife of a physician in New York, with a predisposition to insanity. She was delivered after a labor lasting four days. You will ask, "Why did she have such a long labor?" I asked the same question, but her husband, a well-known physician, and other doctors, including one of the most distinguished obstetricians in New York, were in attendance. The soft parts were badly injured and sloughing occurred. A few weeks afterwards I was called in and performed several plastic operations. Her recovery was prompt, but about a week afterwards symptoms of melancholia appeared and she is now helpless and requires constant watching by her nurses, as she wants to take her life. Dr. T. A. Emmet was consulted, and stated in a letter to me: "You know, as well as I, that in some patients operations on the genital organs are always followed by insanity. Time is usually the cure." It is to be hoped that such may be the result in this case, but this and the other cases narrated have been profoundly impressive to my mind of the serious results upon the mind which may attend gynecologic operations.

Dr. Joseph Price, of Philadelphia, Pa., said:

Mr. President: With considerable practical experience in this subject I am satisfied that the profession is too prone to mix up coincidence with cause. A great many of these patients are victims of procrastination, and a few, and only a few, who escape death are victims of delay and subjects of blood poisoning. I, myself, have repeatedly operated on insane women and I have removed 5 women from one asylum and 2 from another. The first one suffered from a fibroid impacted in the pelvis and vagina and filling up the pelvic cavity. The tumor was delivered by the application of forceps, and by morselment. She returned to her husband and her family and is now a well woman. Another person suffered from mental disturbance associated with fibroid tumor and with ectopic pregnancy. Out of 86 cases of ectopic pregnancy not one was right mentally. Physicians, husband, mother, and father say that the patient was not right. A few years ago a physician of considerable prominence and standing in the South, while visiting me, remarked that Dr. —— had removed an extra-uterine gestation sac from his wife. Together we did an extra-uterine operation and after the operation I placed the specimen in a basin in order that he might see it, and while showing it to the husband I asked the doctor and the husband of my patient about the mental condition of their wives. The lawyer stated that his wife had not spoken to him for some days; her mind was not right. Her improvement was immediate. In regard to pus cases, I have a woman

now in bed who knows nothing about her condition antedating the section. Now she knows everything, but does not know when she was moved, when the operation was done, or anything about it. I had another unconscious and maniacal case requiring two nurses. She offered to testify in the Josephine Mallison case, who had a similar operation. I found her in bed and dying of pyæmia. She recovered her mental and physical condition sufficiently to follow the man who was responsible for her contamination and to kill him. It is not worth while to say anything about criticisms that may be made; Dr. Rohé can just go on paying no attention to newspaper articles or to the carping of ignorant critics. I know that at least 10 per cent of the women confined in asylums could be taken out. Dr. Rohé dwelt on the importance of the sacral plexus of nerves which are impinged on by retro-displaced uteri. I recall the case of a young woman who entered my office with retroflexion. She was devoted to her husband and her child, and she was afraid that in some paroxysm she would do some harm and she asked for some relief. I told her physician to put her to bed, replace the uterus and apply a pessary. That woman took the pains to enter my office afterwards with her husband and father to thank me. You may say that these women are not insane, but you would think otherwise if they were your own mothers, sisters, or wives. One of my recent patients was a hard-working German woman. She had some mental disturbance following a closure of the cervix, which should not have been done. She ceased to take any interest in her home, her husband, or her children after the cervical operation, but sat all day in a corner, silent and morose. There was some question of putting her in an asylum. It happened that a patient of mine brought this woman to me, and I found everything in her pelvis bound down by adhesions. I sent her to a hospital and removed the pus tubes and ovarian abscesses. For two days she was almost unmanageable; then her mental horizon cleared up, and she is now able to take care of herself and to read the German papers. As regards plastic surgery: I think Dr. Currier's patient was operated on too early and had too many attendants. She should have been sent to the seashore to tone up. Three days cost Princess Charlotte her life. It was a case of too many doctors. If six or seven doctors are attending an ill doctor he always dies, but if he has one or two in attendance he usually gets well. [Laughter]. I had a neglected puerperal case four days in labor, who told me that there were animals and flies on the ceiling which were annoying her. This was the only case where I ever saw delirium before delivery. That was a case of acute sepsis such as Keith speaks of in his Surgery. That could have been relieved and her mind also saved by skillful midwifery. I want to return to the question of mania in fibroid disease. I am satisfied that there are few women with fibroids who are perfectly rational. These cases should be treated by early hysterectomy. I recall Keith's first hysterectomy where the patient came back weeks after recovery and complained of a potato which had been served with its jacket on.

What are the sequelæ of operations? I have 17 patients in bed now with legs as small as my wrist. These 17 women are on one floor and are very anæmic. The operations were so complicated that it was necessary to drain 16 out of the 17, all recovering. Some were pyæmic, with marked mental disturbance and I would not be surprised if some should wind up in asylums, but with perfect surroundings they would get well. The trouble is that these patients are hurried home from the hospitals too soon, and they have insufficient food and clothing, cruel husbands, or friends who do not understand their condition. Farmers' wives head the list in asylums. It is a very common thing to attribute insanity to the operation, but we might just as well attribute their insanity to the burning of the last baking of bread, or upsetting a pail of milk, or the chickens dying of gapes, since they bake every week and go insane every week. A few years ago I did a perineal operation on a widow with two sons, in Philadelphia, and put a crutch in anteriorly. Five or six days after the operation (perhaps longer) her mental condition was perfect. It so happened that she had a very pretty nurse. Those boys sat down and chatted with the nurse.

Suddenly the woman became jealous of the nurse and discharged her, and her mania dated from that time. Some one attributed the mania in that case to the ether and the operation. It is interesting to note that in this particular case mental disturbance did not follow the use of ether and an ovariotomy done by Baker Brown many years ago.

Dr. Rohé, in closing the discussion, said:

Mr. CHAIRMAN: It appears to me that the first case reported by Dr. Currier should be attributed to shock. It is a fact that the shock of an operation in a person predisposed to insanity may produce an outbreak of delirium which passes away rapidly. Such patients are not insane at all. One of the things I want to protest against is to call such slight and transitory delirium insanity. The second and third cases Dr. Currier reported both had histories of insanity and it is just possible that the depression caused by the operation developed a latent tendency to insanity. Although there is no evidence of sepsis I am inclined to think that these were due to sepsis. Dr. Price, in his remarks, drifted away a good deal, but he is always most interesting when he is drifting. [Laughter.] The case he mentioned of impacted fibroid was clearly, to my mind, a case of septic insanity, and the woman's mind cleared up when the cause was removed. In regard to the German woman to whom he referred, it is evident that the operation on the cervix was not the one needed; the operation that he did was the one that was needed. The case of insanity following labor, to which he alluded, also goes to show what I contended for, namely, that puerperal insanity, in a large majority of cases, is septic insanity. Dr. Price has said that profound anæmia causes a predisposition to insanity and that the way to keep such patients from insanity is to feed them well and keep them from anæmia. That lies outside of the domain of the abdominal surgeon. If all the cases which come to the surgeon were in good physical health, if their blood was in good condition, then I do not believe that mental disturbance would follow an operation once in five thousand times. Unfortunately, however, mental disturbances *do* follow surgical operations, but it is not fair to say that the insanity is due to the operation.

THE EXTRAPERITONEAL TREATMENT OF THE STUMP IN SUPRAVAGINAL HYSTERECTOMY.

BY JOSEPH PRICE, M. D.

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In approaching this much-mooted question of surgery I am constrained to beg in advance the patient hearing of those who agree with me and the careful consideration of those who are inclined to follow after the strange gods of innovation. In surgery, as in all else, there comes a time when it seems as if the old had outlasted the period of its usefulness, sinking into what might be called persistent but devitalized animation, falling short but never yielding, necessitating the vigorous push of innovation to make it quit its persistent but senseless grasp. Such is the logic of those who, in the operation of supravaginal hysterectomy, would have us abandon the old for the later methods of treating the pedicle. The logic of their position, while not always clear, never lacks in assertion and, while sometimes scanty of facts, atones for failure in this respect by a wealth of imagination.

"Sir," said a celebrated member of Parliament, "the gentleman relies upon his memory for his wit and upon his imagination for his facts" and in the same category must be placed some, many, of the statements concerning the assertions both against the extraperitoneal treatment of the pedicle and for the sub, intra, or, what you will, revised, eliminated, and improved procedure. As an illustration of the mare's nest the opponents of the older method find in which to hatch out the calamities of

the procedure, evidence the following. In a recent paper on the subject a prominent operator says:

The ordinary operation, which is the final resort in such cases, offers few attractions to the surgeon. Most of the surgeons who perform it in the United Kingdom have, at some time or other in the course of their experience, expressed dislike or even "detestation of it." The proceedings involve abdominal section, a large incision being necessary, the dragging forward of the uterus with its mass of tumor, strangulation of the broad ligament and tumor by a piano wire, or its equivalent appliance, passed around some portion which shows nearest approach to a neck, if such exists, and cutting off of the tumor mass. Whatever may be the details of the method which may be adopted for securing the stump and protecting the peritoneal cavity, two objectionable results are inherent in the operation: first, the sloughing, with more or less fetor and pus formation, of the strangulated portion; and, second, the existence of a band of tissue from the uterus to the lower angle of the wound—a sort of potential bowel trap for the rest of the patient's life. Some operators also refer to the tension of the uterus under the strangulating wire, and the occasional dragging upon the bowel with sometimes fatal consequences, either immediate or remote. My experience of this operation leads me thoroughly to sympathize with the aversion expressed by some surgeons. * * *

With Hamlet we are ready to exclaim, "Angels and ministers of grace, defend us!" But gratitude shall take the place of imprecation and we are truly grateful to our foreign confrère, estimable gentleman as he is, for thus exposing his faulty understanding of the operation he so freely criticises to its detriment. And now, to state the case clearly in order to have a clean basis for argument, what are we asked to do in this matter? I submit a reply as follows: Lay aside experience; accept theory and the dictum of those who for the most part have had no experience, but who seek to establish their assertions by a few cases, none of which are crucial, and avoid the issue in those in which they are forced to confess their improvement not only does not improve, but will not apply at all. And unfortunately, also, we are asked to condemn the old operation from the understanding of those who, as the quoted condemnation only proves, do not understand it at all. This matter has come down to what in theology is called "polemics," and I submit that it is not theory but surgery that we want; not ink, but ideas; not the disgust of failures, but a faith, a belief, and a zeal according to knowledge. Let us see. The above description is as vague as a somnambulistic wandering. The nœud, according to him, is passed around some portion of the tumor which shows the nearest approach to a neck, if such exists. He does not tell us where it is put if no neck is found. My own suggestion on this line is that it be put around the neck of the surgeon who operates in this fashion. Here let me boldly assert that, whether a neck is or is not present on the tumor, a surgical pedicle can always be made in all cases in which the tumor is at all removable. This has been my experience in 111 cases involving growths of all kinds, adhesions of all kinds; bowel, pelvic, and omental, and of the bladder. The abandonment of any operation on account of inability to make a stump, or preferably pedicle, has not occurred at all in my own experience, and therein lies one great superiority of the method, to wit: that it is applicable to all cases in which any stump can be made and need not be abandoned for some other method in bad cases. This is no mere assertion. Witnesses for the reality of these claims are at hand on all sides. So far as "detestation" of the operation is concerned, there is a magnitude and uncertainty of the extent of implication and complication of every hysterectomy that must make every surgeon of experience dread them; but, so far as dreading the clamp or nœud, I, for one, when I have the pedicle secured in the never-failing hold of a well-placed delta wire, must confess to a feeling of victory won and a sense of security that has no doubt of safety for my patient.

As to the assertion of the inevitable sloughing that occurs in the pedicle, and the accompanying fetor, I yield the palm of censure to those who have it and make it and confess to it. There is no use of apology or explanation. They are right in abandoning the method. That such calamity must occur according to the method

previously referred to and quoted is patent to all; but that, I submit, is not the surgery of the operation, no more than strangulation on the gallows is death by the guillotine, and the opponents of the operation are exactly right, from their own understanding and practice, in attaching to it all the opprobria they feel they merit. As a matter of fact suppuration and fetor do not follow the use of the serre-nœud, for the simple reason that the tumor is not strangulated en masse and the process of its elimination is one of continual constriction and desiccation, without odor or even oozing; and so far as the stump is concerned, the use of the drainage tube is not indicated. When this is used there is reason found in complications entirely apart from the formation of the pedicle. As to the "potential" bowel trap by reason of the band of adhesions in the lower angle of the wound, I confess to an admiration for the term applied. Grammatically it is correct, surgically it is misleading. The potential mood is one of possibilities, but here we do not care to imagine what may, can, might, could, or would happen, but what is. It would have been more to the point to have cited the real, proven danger of this factor and not to have used it as an argument to conjure with.

What, then, have we been asked to do in this matter? I reply, to take and act upon the criticism of operators absolutely at sea in their understanding of the pedicle operation and of its behavior. Their condemnation of it, for the most part, with few exceptions, lies in the fact that they have failed in it and therefore they seek something new; and in order to establish this new order of things wholesale assertion takes the place of experience, and misconception is judge and jury in the case. Let us consider their argument from their own standpoint: First, the uterine arteries are tied. This is a desideratum and a *sine qua non*. But this does not answer and to control hæmorrhage bleeding points in the tumor must be tied off. Here, it is well to remember, we are met with the anatomical fact that in the uterus there are sinuses rather than vessels and this fact will explain the great ooze found in about all of Sinclair's cases, necessitating the drainage tube. This is not present where the nœud is used. It becomes at once patent that here is a condition in which ligaturing does not ligature.

While it is thus evident that simple tying of bleeding points does not control hæmorrhage, there is still further proof that the structures met in the pedicle or stump do not yield at once to ligaturing or even strong compression. When the nœud is applied and firmly tightened until every particle of oozing disappears, as the dressing of the wound goes on, or even while the stitches are being put in the abdominal incision, only a few minutes elapse until bleeding is again renewed and it is necessary again to tighten up the nœud. This does not happen once but many times during the first few hours subsequent to operation. It at once becomes apparent, therefore, that the stump is shrinking, condensing on itself, separating itself from its serous constituents; the very process by which its dryness and freedom from all slough and gangrene is guaranteed. This is a step and a peculiarity concerning which the critics of the operation are apparently ignorant *in toto*. To say, therefore, that there is no essential difference between the ovarian and uterine stump is simply the grossest misrepresentation. The uterine tissue, disorganized by fibrous growth, does not receive ligatures kindly, neither is there present in its structures the resistant force found in the ligamentous structures of the ovarian pedicle. In using the nœud to control the bleeding pedicle the entire mass is brought outside the peritoneum with not a single ligature within it. The contrast in the intraperitoneal method is wide when we consider the number of ligatures required, and the real uncertainty in placing any one of these as to whether it is going to hold. All operators of experience dread the placing of a multitude of ligatures in the abdominal cavity and the bigger they are the more danger of after ill effects from them. In addition to this objection, comes in the important element of time required to place them. It is all well enough to argue about time and taking care to reduce the dangers of long operations from ether and shock, but it is the business of the

surgeon to avoid a long operation when a short one will do and, in addition, have all care taken of the patient. If the truth was known, it is the time element that causes most deaths from heart failure, collapse, and the like. The removal of a fibroid uterus, when the adhesions are universal, is bound to be a comparatively lengthy operation outside the mere technique of its removal, and this, therefore, should be the simplest and safest possible. Under this head I may again notice, I trust for the last time, the criticisms of the scientific side of the operation. The advocates of the intraperitoneal method have all at once become sticklers for science. And herein is a vast contrast with their knowledge. The poet says:

> Knowledge is proud that she has learned so much;
> Wisdom is humble that she knows no more.

It would be a distinct gain to our scientific knowledge of this subject had its critics the wisdom to learn all about it before they discuss it. The strangulation of the stump is crude, barbarous, unscientific, yet these same men do not hesitate to plunge a needle boldly down into the uterine structures, on either side, to control the uterine arteries. And the tissue comprised in these ligatures of itself would make a fair-sized stump. Constriction by ligature is only different in degree, not in essentials, from snaring by the nœud. "Scientific," so far as surgery is concerned, should mean successful, safe, and able to show results. I take it that the general understanding of the word as applying to real knowledge should also be here considered. The trouble with many of the critics of the method under consideration is that they have neither the knowledge of the method nor the art to apply it. A great deal has been said about the statistics of the operation, about Fritsch's having abandoned it, although his mortality was brought down to seven per cent by its application. This in reality amounts to nothing. Mr. Keith abandoned surgery of these tumors for electricity, so we are made to think, yet Mr. Sinclair does not hesitate to tell us how it was necessary in several of his cases to resort to surgery after the trial of Apostoli's faith cure. On the other hand, Martin unhesitatingly abandons the intraperitoneal method and is seeking for a more excellent way. I wish he were here to speak for himself; and certainly, when we consider his wonderful dexterity, which seemingly is never lost for an expedient nor stumbles on itself, his dictum must count for a great deal. That I or any one should be anxious to better our methods is a natural desire of saving life and lessening mortality, no matter by how small a degree; but I can not abandon the certain for the uncertain. The great misfortune is that in the desired substitution of this new for the old operation a dozen or two of cases are put alongside of twenty years' experience, and the essential difference of nature and numbers is not taken into consideration at all. Bantock's argument is at once pungent and to the point. I quote it *in extenso:*

As I have already pointed out, the author's cases were all favorable for the application of this method, but when he shall have had a long series of cases I feel confident that he will find the exceptions more numerous than he at present dreams, unless he makes a careful selection—a proceeding that would at once vitiate his position. It is only proper here to remark that the great shrinkage of the flaps in the intraperitoneal method has also been observed, and that therefore this matter, in the hands of operators advocating the latter procedure, has at once become a denial and a confession.

The treatment of the cervical canal in the intraperitoneal management of the stump is a rock upon which its exponents split. In the paper so often referred to the author says: "From these and other considerations I resolved that, if opportunity offered, I would amputate the uterine mass and disregard the uterine canal. If, with a clean vagina, it maintained a free communication with any cavity or collection of fluid which might form in the stump, then it would act as a drain." Per contra, let us look at Leopold's statistics. The pedicle was left intraperitoneal in 22 cases with 5 deaths and these deaths were all due to septic peritonitis through the cervical canal.

Leopold's conclusions of the whole matter are worthy of consideration by all those with ultra opinions on the absolute safety of the intraperitoneal method. He says: "When only a small opening has been made into the uterine cavity, the uterine artery should be ligated on both sides, the exposed mucosa cut out in funnel shape, the opening closed by sutures according to Schröder's method, and the peritoneum

sutured together so as to cover the wound. Then the stump may be safely dropped into the peritoneal cavity."

This suggestion covers the enucleation of fibroids from the uterine wall. If, however, the uterine cavity is widely opened, or the tissue of the stump soft and friable, brittle, or cavernous, or if the condition of the patient is so poor that we do not care to tax the absorptive power of the peritoneum, it is far safer, and even necessary, to leave the pedicle extraperitoneal.

What a remarkable commentary is the verdict of this remarkably successful surgeon of wide experience upon the dictum of a class of operators far inferior to him from an operative and analytical standpoint!

He freely points out the danger in a class of cases which, to listen to and judge by their discussion, only exists in the minds of those who do not wish to abandon the old for the new method.

From all these points, as I shall endeavor to show by a diagrammatic demonstration of the method of forming a pedicle, it must remain unquestionable, in the light of my own experience and results, that the extraperitoneal method is at once the safer and simpler and most general in its application, and therefore the one to be preferred. As to the accidents that are commonly classed under a head peculiar to it, these, I trust, will be mentioned in the discussion. Suffice here to say that the nœud should never slip, that the bowel should never be included in it, and that by care the bladder and ureters ought never to be involved. These calamities have each occurred to me once, and I am free to condemn myself as responsible for them, and do not lay it to the method.

Finally, I am convinced that if it is concluded for any reason that the nœud can not be complete, extirpation is likely to be the safest resort and therefore the one to be selected. This, however, opens up a field of discussion too wide for a single paper, and I leave the matter with the mere suggestion.

Results and statistics are wholly in favor of the extra and supraperitoneal and clean extirpation. The latter procedure I do not oppose. I have practiced it successfully; but the risks are greater than in the old and established procedure.

ONE HUNDRED OPERATIONS FOR SEVERE STRUCTURAL DISEASE OF THE ABDOMINAL AND PELVIC ORGANS OF WOMEN.

By I. S. STONE, M. D., Washington, D. C.

The author has adopted the usual method of surgeons in reporting cases as they occur in practice. It is also convenient, as it furnishes an opportunity to take into consideration the propriety of methods and an inventory of results. The present list includes the work in this department from November, 1888, until the end of February, 1893. By far the greater part of this surgery has been done in Columbia Hospital, in this city, where excellent facilities are afforded.

It is the rule in this hospital to call a consultation of the staff to determine if the case in question be a suitable one for operation. It is not proposed to consider here the advisability of this rule, but one very excellent purpose is accomplished by it—*i. e.*, the prevention of unnecessary surgery. There can be only slight danger of a charge of too frequent use of the knife or of undertaking too many easy operations, although there is danger of disadvantage to the patient from delay. On the other hand, it is the custom to operate only when life is in danger, or when the patient is no longer able to work, and when definite and generally extensive disease can be discovered by any one not necessarily an expert in pelvic examination.

The list shows how large a proportion of cases of pelvic abscess, or tubo-ovarian abscess, have been treated. On the other hand, it may be seen how rarely have operations been performed for oöphoritis, salpingitis, etc. Again, it may be observed how seldom operation has been done early enough to find only "pyosal-

pinx." In but six cases in forty-four, where pus was present, could it be said that the disease had not extended beyond the tube. These were not necessarily recent cases, for they were in some instances still "pyosalpinx" after years of waiting and suffering, and good, bad, and indifferent treatment. The rule is nearly correct, however—first, elytritis or endometritis, then salpingitis, pyosalpinx, tubo-ovarian abscess, and pelvic abscess. The period of time required to accomplish these steps in the formation of a pelvic abscess differs greatly, and bears intimate relation to the cause of infection. Of this I shall not write at present.

Pelvic abscess.—Seventeen cases of pelvic abscess were treated by radical operation, with 5 deaths. Of the 17, 7 resulted from infection during or following abortion. In 4, quite positive evidence of gonorrhea was ascertained to have been the cause of infection and suppuration. In 4, the abscess formed soon after delivery at term, and was due to puerperal sepsis. The source of infection in the remaining cases could not be ascertained.

The amount of pus in these cases varies greatly, from a small quantity to a quart or more. The quantity of pus does not always indicate the extent of disease or bear direct relation to the prognosis.

In more than one case the remnants of ovaries and tubes removed were but slight evidence of the severity of the operation, or the very critical condition of the patient. In not one case could the pus have been reached satisfactorily by aspiration.

The list includes—with two exceptions—all cases of pelvic abscess occurring in my service during two years. In one of the cases, not mentioned, occurring in a private patient, the abscess was low enough to be reached by vaginal incision and drainage. She recovered and improved greatly, notwithstanding the presence of the diseased appendages, which remain and threaten a repetition of the suppuration on the other side. In the other *exception* the patient would not consent to operation when requested, left the hospital, and returned in a week ill with peritonitis, which was not relieved by vaginal incision or later by abdominal flushing. The operation in nearly every case involved the separation of omental adhesions from the anterior abdominal wall, as well as from the uterus, bladder, and upper wall of the abscess and intestines. In at least two the omentum was tied off entirely across the lower border.

The abscess wall consists of Fallopian tube, ovary, broad ligament, pelvic wall, omentum, mesentery, uterus, and Douglas's *cul-de-sac*, and involves the bowels in some instances nearly to the umbilicus. In no case was the pus found within the broad ligament. The tube and ovary, having been the first to receive the infection, are generally distorted and even disorganized, in some instances forming but a small portion of the abscess wall.

No. 67, a pyæmic mesenteric abscess, had developed without apparent infection of either tube or broad ligament.

Result of operation in pelvic abscess.—Severe shock generally follows an operation in each case. This has been anticipated as far as was possible by the administration of heart tonics and stimulants. Usually an hour is required to complete the operation in so formidable an undertaking. The temperature is generally reduced by section, and is often subnormal and very unreliable, as it fails to indicate correctly the extent of sepsis or inflammation. The pulse is generally quick, often reaching 140 or more, and is indicative of shock and exhaustion. These symptoms of shock may continue for two or even three days; then, if the bowels are open, the patient readily recovers.

With the exception of the opium habit in one case, which was formed during the many months of suffering the poor woman experienced prior to section, I know of nothing but perfect results in the cases of patients surviving laparotomy for pelvic abscess.

One woman has, since her recovery, returned to the lying-in department of the hospital and safely given birth to a child at term.

Pyosalpinx, tubo-ovarian abscess, hydrosalpinx, cystic ovaries.—In 27 of this list of 34 cases pus was present and poured out of the abdominal incision when the pus sac was ruptured, or when the separation between the distal extremity of the tube and the ovary occurred, which often happens when a tubo-ovarian abscess is removed. In the other cases no free pus was present. Two of these were purely hydrosalpinx with cysts of the corresponding ovary. The others were large cysts of the ovary, in one instance containing a pint of fluid. In each case the contents were regarded as infectious. The infection in each case had entered the tube and been communicated to the ovary through the uterine mucosa. No positive evidence of tubercle could be ascertained in any case.

In 13 the disease was a result of gonorrheal infection. In the other pus cases infection was nearly always found due to septic abortion. In a few no cause could be ascertained.

A rise of temperature was observed in nearly every pus case prior to section. The pulse was generally quick, and pelvic examination revealed pelvic peritonitis with the ever-present fixation of the uterus and more or less distinct masses on either side of the uterus or filling the pelvis entirely.

Immediate result.—In this list 2 deaths occurred. The first was due to an unsuspected pyæmic uterus from a "missed abortion." The patient had only a cystic ovary removed and did not have pyosalpinx. The other death was due to shock following section. This patient, a German Jewess of poor intelligence, had previously been treated in the hospital for mammary abscess. She was discharged well. In a week she was back with a severe attack of peritonitis, feeble pulse, great pain, and high temperature. She improved again, and when an operation was finally determined upon another attack of peritonitis occurred which the operation failed to relieve. The favorable moment in this case was lost. The patient resisted every measure taken for her relief and insisted upon vomiting or otherwise discharging all food and medicine given for her relief. There should be hardly any mortality in these cases.

Final results.—However much disputation there may be as to the propriety of abdominal section for nervous or mental disease due to ovarian degeneration or irritation, there can be very little plausible objection to operations for pus. The final result is, as a rule, very satisfactory. Some women have all the symptoms due to menopause after the removal of large ovarian abscesses which have existed for months, and which leave no visible remnant of the ovary to be recognized as such. There may be a mere shell or thin sac left, yet menstruation may continue at regular intervals before and after the operation.

These consequences, of however great importance, should not and do not deter the surgeon who operates to save life or even to prevent invalidism. I am quite of the opinion that no surgery is of more importance, or attended with better results in every way, than that for the suppurative pelvic disease of women.

Nos. 21, 35, and 50 required a second operation in each instance. No. 21, a blood cyst of the ovary, right side, was removed with great difficulty. The left ovary was so small and concealed by adhesions that I could not find it. It grew to form another blood cyst, which I removed some months later. No. 78: I found the viscera transposed in this case, the appendix on the left side.

No. 35 had oöphorectomy done, removal of hydrosalpinx, etc., for menorrhagia and pain, and afterwards required vaginal hysterectomy for sarcoma of uterus.

No. 50: A sinus opened up and an infected ligature removed, which had been used in tying off a small myoma attached to the fundus uteri.

With the above-mentioned exceptions, I know of nothing in any of these cases but a perfect result.

The author rarely finds a case for operation in the stage of primary inflammation. If surgeons generally can detect a salpingitis early enough to prevent a gonorrheal infection of the peritoneum by a resort to salpingectomy, such practice I should consider correct, but it has not been my experience to find these cases in hospital or

even other practice. The suppurative stage is reached and the case is no longer one requiring hot douches, iodine applications, etc., but demands surgical treatment. In short, I consider salpingitis of infectious character of short duration, and not often do many days elapse before pus has formed, when it is practically no longer a salpingitis but a pyosalpinx—an abscess.

Oöphorectomy for myoma.—As may be seen in the summary, only twice have I operated with the intention of checking the growth of uterine myomata. In one case—in a young lady—the operation was easily done and gave a very good result. The tumor is not growing and her mental condition, which was very greatly disturbed, has improved until, in fact, she is quite well. She ceased to menstruate, and I think the operation will prove a success.

In the other case a negress had a large pelvis-bound myoma with suppurating tubes and ovaries, which were with great difficulty removed. The patient had unexpected mania for two weeks, beginning a week after the operation. She recovered from the operation and returned to her home, lived about a year longer, and I have not learned the cause of her demise. This case is the only one in which I have considered the removal of the tumor an impossibility. It is probable that the patient would have died under the operation had entire removal been attempted.

Vaginal hysterectomy.—Only 3 cases of uterine carcinoma were thought favorable for complete extirpation. In nearly every case sent me by physicians the disease was found already too far advanced to hope for a complete extirpation and eradication of the disease.

My earlier experience (1886 to 1888) with this operation was confined to cases of which I can say nothing but that it was not good practice to attempt complete extirpation in such advanced disease.

In one case (No. 81) the uterus was removed for procidentia.

Silk ligatures were used in each case. The operation is quite an easy one, and should be frequently performed if cases are found sufficiently early. In each case the recovery was comparatively uneventful. One case required the combined abdominal and vaginal method, the bladder being torn in the operation, it being apparently softened by disease. It was immediately sutured, and the patient had perfect healing in every respect before she left the hospital.

Battey's operation.—In all cases where the ovaries were removed for the purpose of curing pain, producing an artificial menopause, or preventing impending insanity, it has been the unvarying custom of the author not only to have careful consultation with his confrères as to the propriety of the operation, but to know beyond a reasonable doubt that other means of cure have been satisfactorily tried. In nearly every case, in addition to this, some abnormal condition—such as enlargement, prolapse, or other result of chronic disease—was discovered before the operation. Five cases of this list come under this heading. All the patients recovered from the operation. One of them, operated on for incipient insanity, recovered well and has been able to attend to the duties of her profession constantly since that time. Another, the second, appeared greatly benefited at first, but in six months committed suicide. I regret to say that I was deceived in this case by the friends and physician of the patient, who failed to tell me of her previous attack of insanity. A third case was not in the least influenced by a double salpingo-oöphorectomy (one ovary being quite large from cystic degeneration).

The other patients had suffered great pain, and were anxious to have something done for them at any risk, and, although the operation was done after due trial of other remedies and because some disease was believed to have been present, yet it was attended with but poor result, as they are (two of them) still complaining.

Uterine myomata.—Eleven supravaginal hysterectomies for myoma, with 3 deaths; 1 death was due to hæmorrhage from a wounded mesentery in a case of complete extirpation (tumor, 20 pounds); the 2 other patients died of shock and obstructed bowels, with very little evidence of peritonitis, five days after the opera-

tion. Three operations were completed by using the wire clamp; 1 death occurred. Three by the ventrofixation method; 1 death. Four by complete extirpation; 1 death. One large, soft, parasitic myoma, operated upon by the Schroeder method, ended in recovery.

My experience leads me to the conclusion that if operators select only such cases as are no longer able to work, and who have very large tumors with great pain—which is almost positively due to severe complications—just so long will the mortality from hysterectomy be high. Per contra, if a diagnosis could be made while the growth is still within the pelvis, and the patient sent to the surgeon for operation before complications—adhesions to viscera, etc.—arise, the mortality would be greatly reduced.

In nearly all of my cases severe difficulties were encountered which greatly prolonged operation, and to this I attribute the mortality. Of the 11 hysterectomies, 9 were done for colored women. Two patients were white and made good recoveries. This shows a death rate in negresses of 33 per cent. I do not consider them good subjects for surgery.

Hysterorrhaphy (*ventro-fixation*).—This operation was done in 7 cases for prolapses or retro-displaced uteri, and in 2 of them prolapsed, adherent, or diseased ovaries were removed. One death occurred which should be charged against the operator or assistants, not the method. In this case a diseased and prolapsed ovary was removed without thought of infecting the cavity of the peritoneum, yet peritonitis quickly developed and carried off the patient. I have abandoned Alexander's operation for ventrofixation. The latter operation is easy of performance and should give no mortality. Three buried silkworm-gut sutures are used to anchor the uterus to the abdominal wall, which in each case have given no trouble and perfectly satisfactory results.

The author has given the names of physicians as reference who were formerly or are at present either the medical attendant or who know the history of the patient since operation. He also takes pleasure in inviting any who desire full particulars of any case herein mentioned to call upon Dr. J. T. Kelly, resident physician of Columbia Hospital, my valued and very competent assistant, who will answer any inquiry.

No.	Age.	Disease.	Cause.	Result.	Drainage.	Remarks.	Date.	Reference.
1	37	Salpingitis, ovaritis, etc	Pelvic peritonitis	Recovery	Yes	Had been an invalid for years	Nov. 24, 1888	Dr. Hicks.
2	26	Tubercular peritonitis	Tubercular appendages.	Died, 5 days	Yes	Repeated attacks of peritonitis for years.	Dec. 15, 1888	I. S. S.
3	27	Tubercular kidney		Recovered from operation	Yes	Nephrotomy	Nov. 17, 1888	Do.
4	38	Hysteria, incipient insanity	Suspected ovarian disease.	Improvement; satisfactory result.	No	Salpingo-oöphorectomy; patient attends to usual duties.	July 5, 1889	Do.
5	33	Hysteria, menorrhagia, pelvic pain.	Cystic ovaries	Cure	No	Salpingo oöphorectomy	Nov. —, 1889	Dr. Christian.
6	35	Menorrhagia, impending insanity.	do	First improvement; suicide later, 6 months.	No	do	June 16, 1890	I. S. S.
7	35	Ovarian cyst, 15 pounds	Dermoid	Recovery	Yes	Many slight adhesions	July —, 1890	Dr. Taylor.
8	29	Cyst of ovary		do	Yes	Cyst 10 ounces; omental adhesions.	Sept. 11, 1889	I. S. S.
9	40	Myoma uteri	In negress	do	No	Wire clamp	Nov. —, 1890	Dr. Hoge.
10	30	do	do	do	No	Ventro-fixation; 10-pound growth.	May —, 1891	Columbia Hospital.
11	40	do	do	Sinus left from ligature	No	Sinus permits pseudo-menstruation from stump of uterus.	June 1, 1891	Do.
12	45	do	do	Recovery from operation	No	20-pound tumor adherent to everything; patient *in extremis* several days; recovery from operation. Mental condition very unsatisfactory before and after operation.	June 11, 1891	Do.
13	35	Parasitic soft myoma, 18 pounds.	White patient	Perfect cure	Yes	Dropped pedicle, which was from right broad ligament; only a small, slender pedicle from original uterine origin, near fundus.	June 18, 1891	I. S. S.
14	32	Retroflexion, disorganized appendages.	Old chronic inflammation.	Recovery	No	Patient had been an invalid for several years.	July 2, 1891	Dr. Gott.
15	30	Hystero epilepsy, pelvic pain, large ovary, salpingitis.	Pelvic peritonitis	Cure of pelvic pain, not of neurosis; improvement.	No	Improvement in health; now able to work.	July —, 1891	Columbia Hospital.
16	28	Pelvic abscess	Puerperal infection at term.	Recovery	Yes	Patient sick 8 months (septicæmia) before operation.	Aug. —, 1891	Do.
17		Extra-uterine pregnancy		Died		Patient in collapse all day before operation. Fourth month, hemorrhage outside sac without rupture.	Sept. —, 1891	Do.
18	20	Suspected tubercular peritonitis.		Recovered from operation and symptoms improved.	Yes	Exploratory operation	Sept. —, 1891	Do.
19	32	Pyosalpinx, chronic salpingitis and ovaritis.	Pelvic peritonitis	Recovery	No	Extensive adhesions	Oct. 5, 1891	Dr. Carr.
20		Pyosalpinx	Gonorrhea	do	No	Tubes like sausages	Oct. 15, 1891	Columbia Hospital.
21	30	Blood cyst of ovary		Temporary relief	Yes	Patient did well for a time, then returned (see No. 78). One ovary not found.	Oct. 26, 1891	Dr. Moran.

No.	Age.	Disease.	Cause.	Result.	Drainage.	Remarks.	Date.	Reference.
22	46	Fibro-myoma uteri, 18 pounds.	Negress	Died fifth day, shock; bowel obstruction, acute yellow atrophy of liver.	Yes	Ventro-fixation; myomata in both broad ligaments.	Nov. 9, 1891	Columbia Hospital.
23	30	Pelvic abscess, many ounces of pus.	Gonorrhea	Died fifth day, uræmia	Yes	No peritonitis after operation; nephritis from specific infection.	Nov. —, 1891	I. S. S.
24	21	Pelvic abscess	Gonorrhea	Recovery, sinus from ligature; afterward closed.	Yes	Appendages and entire pelvis filled with pus.	Nov. —, 1891	I. S. S.
25	35	do	do	Recovery	Yes	Tumor nearly to umbilicus	Nov. 30, 1891	Do.
26	32	do	Abortion, infection	Died 24 hours, shock	Yes		Dec. —, 1891	Do.
27	34	Cyst of ovary		Recovery	No	Cyst filled pelvis; everywhere adherent.	Jan. 4, 1892	Do.
28	30	Pyosalpinx	Gonorrhea	do	No	Tubes like sausages; patient ill 16 years.	Jan. 7, 1892	Dr. Ritchie.
29	24	Hydrosalpinx	do	do	No	Chronic pelvic peritonitis	Jan. 18, 1892	Columbia Hospital.
30	27	Pelvic abscess	Abortion	do	Yes	Tumor-like fibroid of uterus to umbilicus.	Feb. 4, 1892	Do.
31	40	50-pound double ovarian tumor (multilocular broad ligament cyst).		Recovery from operation	Yes	In 9 months abscess formed under broad ligament (*see* No. 74).	Feb. 8, 1892	Do.
32	24	Pyosalpinx, tubo-ovarian abscess.		Recovery	Yes	Pelvic organs all adherent en masse.	Feb. 10, 1892	Dr. Bowen.
33	25	Pyosalpinx	Gonorrhea	do	No	Easy operation and recovery	Feb. 15, 1892	Columbia Hospital.
34	19	Pelvic abscess	Abortion	Died	Yes	Shock third day	Feb. 17, 1892	Do.
35	25	Hydrosalpinx, menorrhagia		Recovered	No	Patient had uterus removed afterward for sarcoma (*see* No. 80).	Feb. 22, 1892	Do.
36	36?	Insanity, cystic ovary		Recovered from operation easily; mental symptoms not improved.	No	Patient in asylum	Feb. 24, 1892	I. S. S.
37	40	Ascites	Movable kidney	Recovery	Yes	Movable kidney not suspected until abdomen was opened.	do	Columbia Hospital.
38	50	Dermoid cyst of ovary, 12 pounds.		do	Yes	Cyst ruptured a month before operation, everywhere adherent; twisted pedicel; nephritis.	Feb. 27, 1892	Dr. Frost.
39	23	Cystic ovaries, retroflexion and old salpingitis.		do	No	Operation very difficult, owing to adhesions.	Feb. 29, 1892	Columbia Hospital.
40		Cystic ovaries		do	No	Ovaries size of hen's egg	Mar. 2, 1892	Do.
41		Fibro-myoma uteri, 20 pounds	Negress	Died third day; shock	No	Extra-peritoneal method	Mar. 5, 1892	I. S. S.
42	27	Tubo-ovarian abscess	Gonorrhea	Recovery	Yes	Bowel involved; fimbria adherent to intestine; necrosis.	Mar. 7, 1892	Dr. C. G. Stone.
43	28	Myoma uteri, pyosalpinx (pus sacs removed).	Negress?	Recovered from operation	No	Patient had mania after operation; the tumor was not removable; patient died about a year later.	Mar. 19, 1892	Dr. Gibson.

44	20	Prolapsus uteri and ovary	Nullipara	Improved	No	Hysterorrhaphy	Mar. 28, 1892	Columbia Hospital.
45	.....	Pelvic abscess	Abortion, gonorrhea	Recovery	Yes	Omentum, bowel, appendages glued together and large quantity pus present.	Apr. 9, 1892	Do.
46	40	Cyst of left kidney, 48 ounces.	Blood cyst	....do	Yes	First suspected sarcoma, but no recurrence; patient perfectly well; sutured sac to abdominal wall.	Apr. 16, 1892	Do.
47	20	Pelvic abscess	Puerperal septicæmia.	Recovery; patient insane for a time after return home.	Yes	The only fecal fistula in my first hundred cases; fistula closed spontaneously; patient well.	Apr. 20, 1892	Dr. Ewing.
48	24	Pelvic abscess, from puncture or rupture of uterus.	Infection by midwife	Recovery	Yes	Intestinal necrosis; many sutures required; easy recovery after second day.	Apr. 30, 1892	Dr. Moran.
49	38	Unsuspected septic uterine contents (abortion), cystic ovary removed.	Abortion, pyæmia	Died 30 days	No, not at first; afterwards gauze	The uterus was large, very pale, and soft, but did not know its contents at time of operation.	May 7, 1892	Dr. Smith.
50	.....	Pyosalpinx, tubo-ovarian abscess.	Infection	Recovered	Yes	Small fibroid removed from fundus uteri; infected sinus, afterwards ligature removed.	May 9, 1892	Columbia Hospital.
51	40	Pelvic pain, uterine prolapse.	Cystic ovaries; relaxed ligaments.	Recovered from operation easily, improvement in health not well.	No	Chronic neurasthenia	May 11, 1892	Dr. Nourse.
52	24	Pyosalpinx, cystic ovaries	Gonorrhea	Recovered	Yes		June 11, 1892	Columbia Hospital.
53	26	Pyosalpinx, tubo-ovarian abscess.	.....do	Recovery	Yes	Several ounces of pus	June 15, 1892	Do.
54	26	Fibro-myoma uteri, size of large cocoanut, mental symptoms.		Mind quite restored; tumor greatly lessened in size at present time.	No	Salpingo-oöphorectomy; easy operation and recovery.	June 18, 1892	I. S. S.
55	22	Tumor of gall-bladder size of large orange.	Gall stones	Many stones found, sinus remained since closed.	Yes	Patient returned, and further search for stones (Apr. 15, 1893); cured.	...do	Dr. C. G. Stone.
56	.....	Retroflexion of uterus, pain and dyspareunia.		Uterus in good position, not otherwise quite well.	No	A cyst of ovary excised, sepsis of wound; no pelvic pain at present.	June 11, 1892	I. S. S.
57	45	Large myomatous tumor, 20 pounds, filling entire cavity; pregnancy, fourth month, not suspected.	Negress	Died third day, hæmorrhage from mesentery.	Yes; tube and gauze.	Complete extirpation; easily done save for attachments to mesentery, which were severely injured.	June 29, 1892	Columbia Hospital.
58	35	Sarcoma uteri, entire uterus involved; tumor nearly to umbilicus, 5 pounds.	Patient had an intra-uterine fibroid removed a year previous; recurrence 8 months afterwards.	Recovery without incident 10 months since; better health than for years.	Yes; tube and gauze.	Complete extirpation of uterus, ovaries, etc; patient has gained many pounds of flesh.	July 13, 1892 Patient still well, Sept., 1893.	Dr. Ames.
59	....	Pyosalpinx, one fimbria attached to intestine; necrosis and danger of rupture; omentum necrotic and large amount of it removed.	Infection	Recovery from operation, and last report quite well.	Yes; tube and gauze packing.	The tube has adhered to bowel as high as crest of ilium, 6 inches from cornua of uterus.	July 20, 1892	Dr. Smith.

No.	Age.	Disease.	Cause.	Result.	Drainage.	Remarks.	Date.	Reference.
60	60	Cancer of uterus		Recovery; bladder involved, afterwards closed; well nearly 1 year after.	Yes; *per vaginam*.	The growth was not primarily of cervix, but of middle portion at and above the internal os.	July 28, 1892	Dr. Hicks.
61	23	Suspected hæmorrhage, intra-abdominal.	Abortion	Recovery without incident.	No	Patient in collapse when brought to hospital; amount of blood very uncertain, hence the exploratory opening.	Sept. 1, 1892	Columbia Hospital.
62	.....	Intra-abdominal hæmorrhage.	Suspected extra-uterine pregnancy.	Recovery	Yes	Abdomen distended with blood; no fetus found.	Sept. 3, 1892	Do.
63	.....	Old sinus, from infected ligature (*see* No. 50).	After removal of small fibroid ligature infected.	Sinus closed	No		Sept. 10, 1892	Do.
64	.....	Suspected pyonephrosis or calculus of ureter, cystitis.		Nothing found	No	Patient had been an invalid, and hence the exploration.	Sept., 1892	Do.
65	.....	Pyosalpinx, tubo-ovarian abscess.	Infection	Recovery	Yes; gauze and glass tube.	Aristol over adhesions; perfect result.	Sept. 17, 1892	Do.
66	23	Pyosalpinx	Gonorrhea	do	Yes	Normal recovery	Sept. 22, 1892	Do.
67	28	Pyæmic abscess, limited to bowels and mesentery.	Abortion, sepsis	Died third day	Yes	Operation had no effect in minimizing sepsis; tubes not enlarged.	Sept. 24, 1892	Dr. C. G. Stone.
68	32	Myoma uteri, 12 pounds	Negress	Recovered	Yes	Complete extirpation	Oct. 12, 1892	Columbia Hospital.
69	32	Ovarian cyst, 15 pounds		do	Yes	Multilocular cyst	Oct. 8, 1892	Dr. Walsh.
70	33	Pelvic abscess, size of cocoanut; right tubo-ovarian abscess.	Puerperal septicæmia, 11 months since last child.	do	Yes; gauze and tube: much hæmorrhage.	This case was in a morphia habituée; critically ill for a week after section.	Oct. 12, 1892	Dr. Beatty.
71	33	Pelvic and ovarian pain, cystic ovary, right side removed.		Recovered from operation, symptoms just as before.	No	Neurasthenic case	Oct. 22, 1892	Dr. Speiden.
72	.....	Retroflexion, cystic ovary removed.		Recovery	No	Hysterorrhaphy, ovary prolapsed and held under the uterus.	do	Columbia Hospital.
73	.....	Pelvic abscess, opened prior to operation.	Abortion	do	Yes	Disorganized appendages	Oct. 26, 1892	Do.
74	40?	Pelvic abscess, extraperitoneal.	"Adenoid" growth below broad ligaments.	Died 2 days, shock and sepsis.	Yes	See case No. 31. Had ovariotomy done, both broad ligaments removed.	Oct. 29, 1892	Do.
75	39	Old salpingitis and ovaritis	Pelvic peritonitis	Recovery	No	Uneventful recovery	Nov. 5, 1892	Dr. Love.
76	19	Congenital displacement of ovaries, salpingitis.		do	No	Battey operation; normal convalescence.	do	Columbia Hospital.
77	21	Pelvic abscess, septic peritonitis.	Abortion, sepsis	Died, shock, third day	Yes	Should have merely washed out abdomen instead of completing operation (40 minutes).	Nov., 1892	Do.

78	.....	Blood cyst of ovary, transposition of viscera.	Pelvic peritonitis.....	Recovered from operation .	Yes.....	Appendix found on left side; general adhesions throughout pelvis, including intestines, uterus, bladder, etc.	Nov. 12, 1892	Dr. Moran.
79	26	Suspected abdominal pregnancy, high temperature, hæmorrhage from bowels, etc.	Relaxation of uterus gave effect of child floating in abdominal cavity.	All symptoms subsided: subsequent delivery *per vias-naturales.*	No.....	Temperature to 105° day before section; two discharges of blood from bowels; patient had been curetted and cervix closed since pregnancy suspected.	Nov. 13, 1892	Dr. Walsh.
80	.....	Uterine hæmorrhage, sarcoma uteri, previous operation (*see* No. 35).	.....	Recovered from operation .	Yes.....	Patient still has some vaginal hæmorrhage. (Since the above, patient well.)	Nov. 17, 1892	Columbia Hospital.
81	25	Procidentia, cysto-rectocele.	Excessive childbearing.	Perfect result.....	No.....	Hysterorrhaphy, ventro-fixation.	Nov. 19, 1892	Do.
82	40	Pelvic abscess.....	Infection(?).....	Recovery.....	Yes; gauze and tube.	Large amount of pus; perfect result.	Dec. 1, 1892	Dr. Bovee.
83	.....	Pyosalpinx, ovarian and pelvic abscess.	Gonorrhœa.....	.....do	Tube and gauze.	Perfect result.....	Dec. 3, 1892	Columbia Hospital.
84	26	Pelvic peritonitis, pelvic abscess.	.....do	Patient very ill at time of operation; narrowly escaped death by shock, then quick recovery.	Gauze and tube.	Patient ill only two weeks since first attack of specific vaginitis.	Dec., 1892	Do.
85	22	Pyosalpinx, tubo-ovarian abscess.	.....do	Recovery.....	Yes.....	Easy recovery; some doubt as to all of right tube having been found.	Dec. 28, 1892	Do.
86	53	Procidentia, cysto-rectocele; ovarian cyst, 6 ounces.	.....	Slight return of cystocele.	Yes.....	Vaginal hysterectomy. This woman without sufficient intelligence to take care of herself.	Jan. 7, 1893	Do.
87	65	Carcinoma uteri.....	.....	Recovery from operation uneventful.	Yes.....	Negress; vaginal hysterectomy	Jan. 14, 1893	Dr. Hicks.
88	42	Tubo-ovarian abscess; opening into bowel; pelvic abscess.	Puerperal infection. 12 years.	Recovery without incident.	Tube and gauze.	Opening into bowel found and sutured; large quantity of pus; aspirated, and sac enucleated.	Jan. 18, 1893	I. S. S.
89	34	Inguinal hernia; previously operated upon in Chicago.	.....	Recovery.....	No.....	Radical cure; removal of sac and omentum; buried silkworm sutures.	Jan. 28, 1893	Columbia Hospital.
90	.....	Sp. salpingitis; tubo-ovarian abscess.	Gonorrhœa.....	.....do	Yes; tube and gauze.	Bowel severely involved; necrosis; perfect result.	Jan. 25, 1893	Do.
91	26	Retroflexion, hydro salpinx, cyst of ovary.	.....	Recovery after severe illness.	No.....	Should have used drainage; patient had peritonitis; the ovarian cyst contained highly infectious serum.	Jan. 28, 1893	Do.
92	35	Pelvic abscess, pelvic peritonitis.	Many abortions, repeated attacks of peritonitis.	Died 3 hours after completing operation.	.....	Patient could not take anæsthetic satisfactorily; morphine habitué; operation done under many disadvantages; had long suffered from bowel obstruction, etc.	Jan. 28, 1893	Dr. Pool.

No.	Age.	Disease.	Cause.	Result.	Drainage.	Remarks.	Date.	Reference.
93	39	Ovarian tumor; ascites, 18 pounds; hydrothorax.	.....	Recovery from operation; dropsical symptoms not yet relieved; patient in fairly good health.	Yes, for three weeks.	Large left ovarian multilocular cyst; small right cyst 32 ounces; suspected malignant disease.	Jan. 30, 1893	Columbia Hospital.
94	50	Procidentia, cysto-rectocele	.....	Recovery	No	Hysterorrhaphy; ventro-fixation; buried silkworm sutures.	Feb. 1, 1893	Do.
95	15	Ovarian tumor, 20 pounds	.....	Recovery uneventful	Yes	Twisted pedicle	Feb. 5, 1893	Dr. Batson.
96	33	Myoma uteri, 4 pounds	Negress	Recovery	Yes	Complete extirpation by abdominal method.	Feb. 11, 1893	Columbia Hospital
97	32	Tubo-ovarian abscess, pyosalpinx	Gonorrhea	do	Yes	.....	Feb. 15, 1893	Dr. C. G. Stone.
98	35	Tubo-ovarian abscess, pyosalpinx.	do	do	Yes	Patient had been ill since first attack of gonorrhea; result far better than expected; complete and satisfactory cure.	Feb. 20, 1893	Columbia Hospital.
99	30	Retroflexio uteri, cystic right ovary.	.....	Died	No	Patient unexpectedly developed peritonitis and died; the cystic ovary may have infected the peritoneum.	.....	Do.
100	.....	Retroflexion, salpingitis, ovaritis, etc.	Excessive childbearing.	Recovery	No	Hysterorrhaphy; salpingo-oöphorectomy.	.....	Do.

SUMMARY.

	Cases.	Deaths.
Pelvic abscess	17	5
Extraperitoneal abscess	1	1
Pyæmic intra-abdominal abscess	1	1
Tubo-ovarian abscess	21	1
Pyosalpinx	6	.....
Hydrosalpinx	2	.....
Cystic ovary (pyæmic uterus)	1	1
Cystic ovaries (infectious)	3	.....
Ovarian tumor	6	.....
Myoma uteri	11	3
Hysterorrhaphy	7	1
Exploratory section	5	.....
Inguinal hernia	1	.....
Vaginal hysterectomy	4	.....
Oöphorectomy for uterine myoma	2	.....
Old sinus	1	.....
Cholelithotomy	1	.....
Cyst of kidney	1	.....
Nephrotomy	1	.....
Extra-uterine pregnancy	1	1
Abdominal hæmorrhage	1	.....
Battey's operation	5	.....
Tubercular peritonitis	1	1
Total	100	15

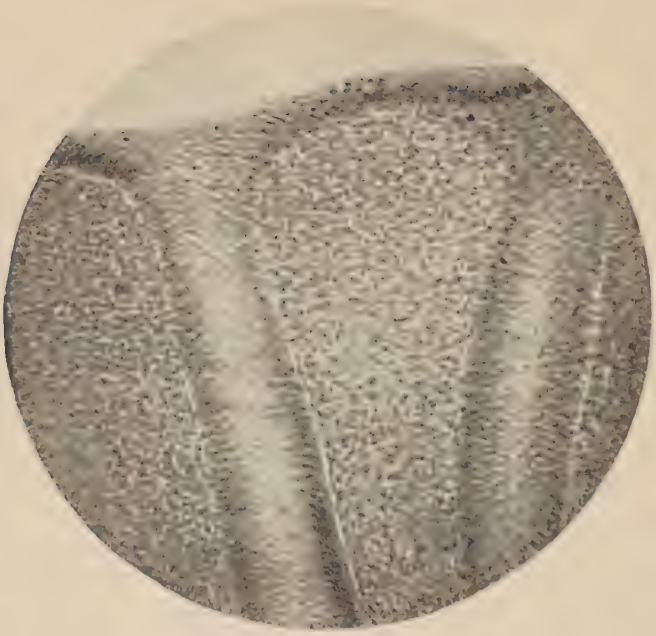

FIG. 1.—Section of normal mucosa and adenoid layer of appendix, showing follicles. × 600.

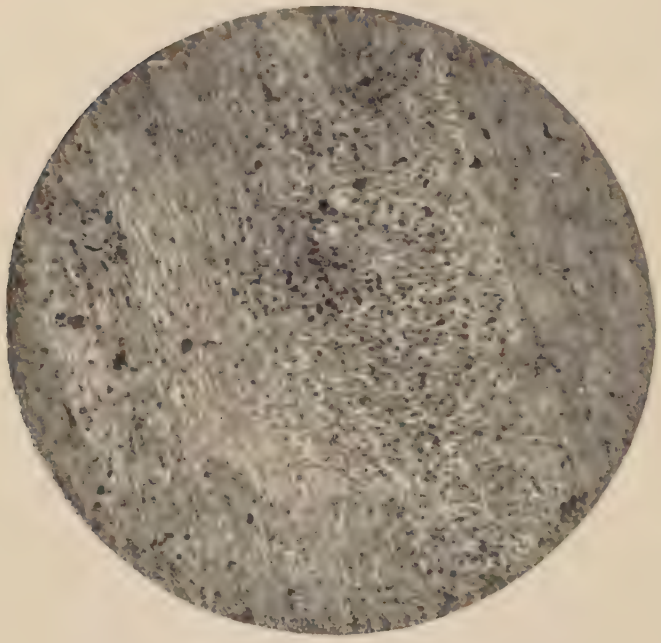

FIG. 2.—Section of muscular coat from mild case of appendicitis, showing infiltration of leucocytes in lymph spaces. × 600.

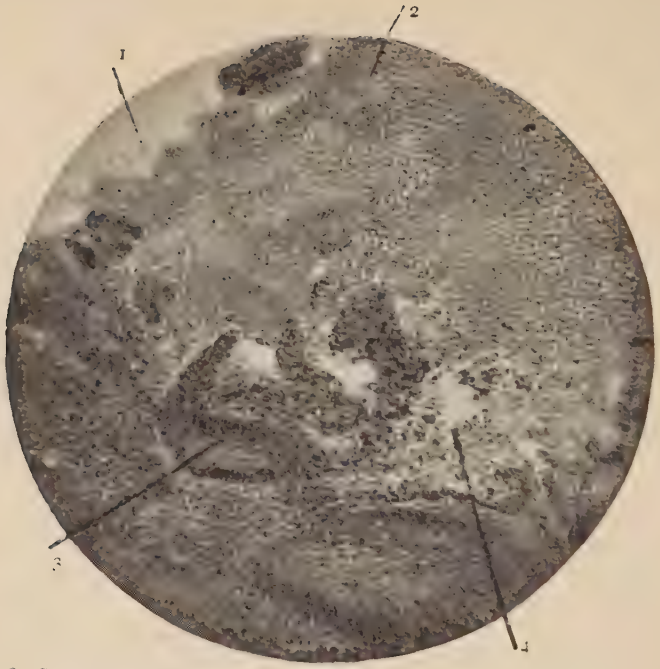

FIG. 3.—Section corresponding to fig. 1, but from mild case of appendicitis. × 600.
1. Free border once occupied by mucosa.
2. Necrotic area.
3. Broken down mucous follicles.
4. Breaking down adenoid tissue.

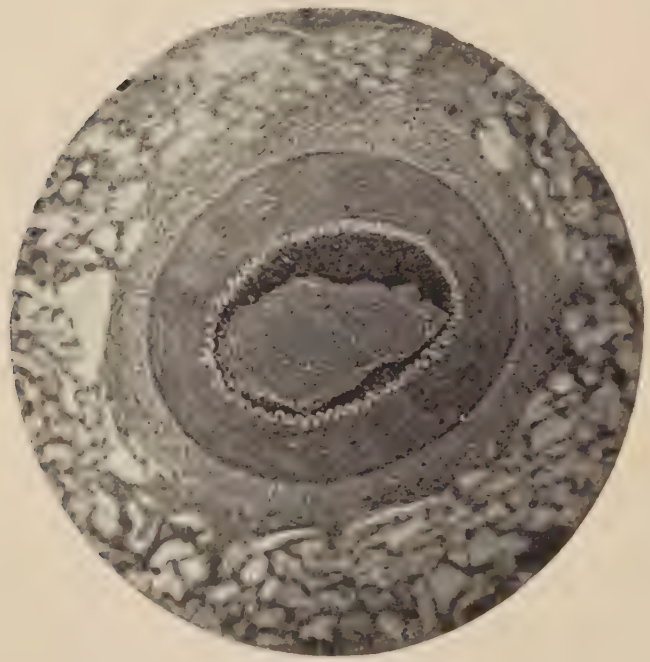

FIG. 4.—Section of solitary artery of the appendix from mild case of appendicitis, showing proliferating endarteritis. × 150.

FIG. 5.—Transverse section of a longitudinally split appendix. Exudation and lymphadenoid proliferation moderate.

1. Mucosa and adenoid tissue bulging a little.
2. Submucous connective tissue not thicker than the combined muscular and peritoneal coats.
3. Muscular and peritoneal coats, not hypertrophic.

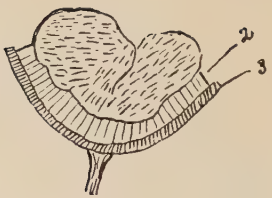

FIG. 6.—Transverse section of a longitudinally split appendix. Exudation excessive.

1. Mucosa and adenoid tissue bulging prominently.
2. Submucons connective tissue about seven times thicker than the combined musular and peritoneal coats.
3. Combined muscular and peritoneal coats.

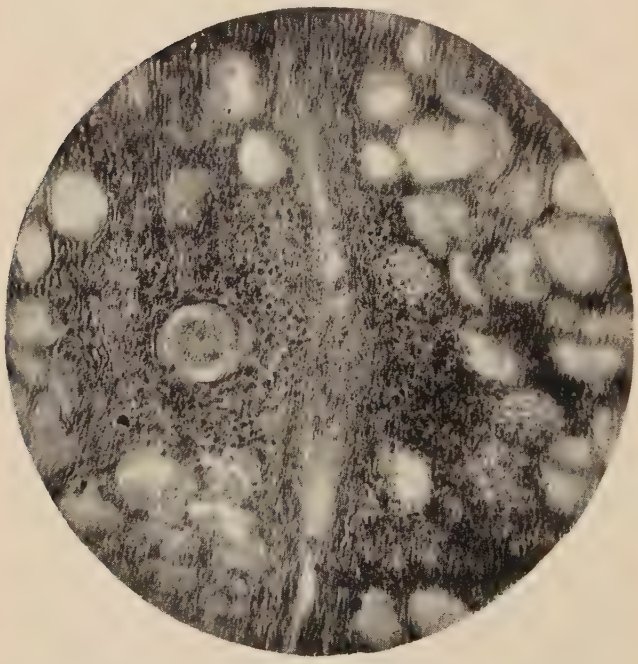

FIG. 7.—Longitudinal section of vein, showing thrombus surrounded by leucocytes, from mesentery of appendix in mild case of appendicitis. × 600.

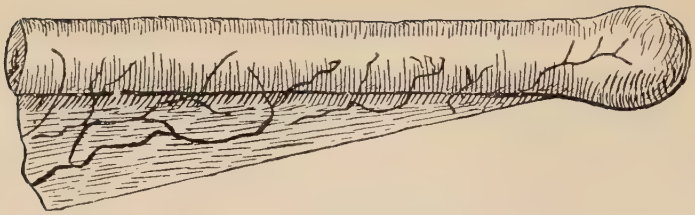

FIG. 8.- Appendix with muscular coat in state of spasm.

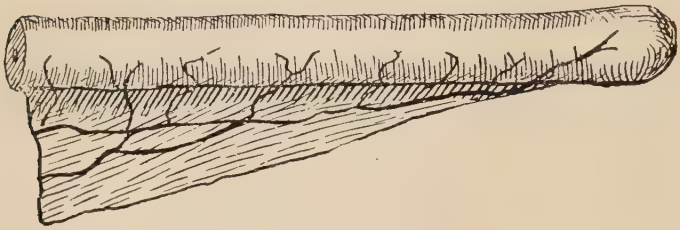

FIG. 9.—Same appendix as in fig. 8 immediately after relief of spasm by cutting mesentery and muscle at base.

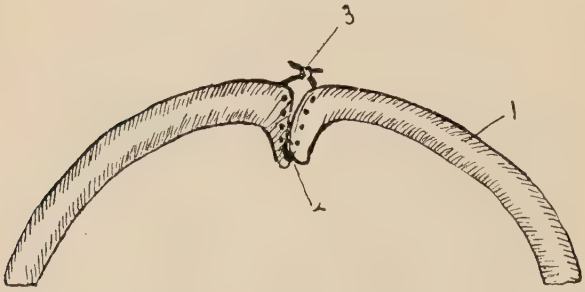

FIG. 10.—Diagrammatic view of stump treated by combined ligature and suture.
1. Transverse section of portion of cæcum.
2. Tiny ligated stump of inner tube of appendix.
3. Lembert suture burying stump. Dotted lines show course of suture beneath peritoneal coat.

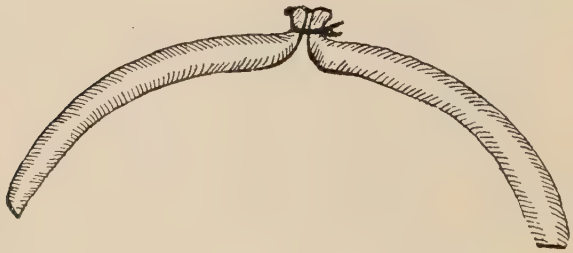

FIG. 11.—Simple but risky method of ligating stump of appendix. Same section as in Fig. 10, but showing ligature of all tissues of unburied stump.

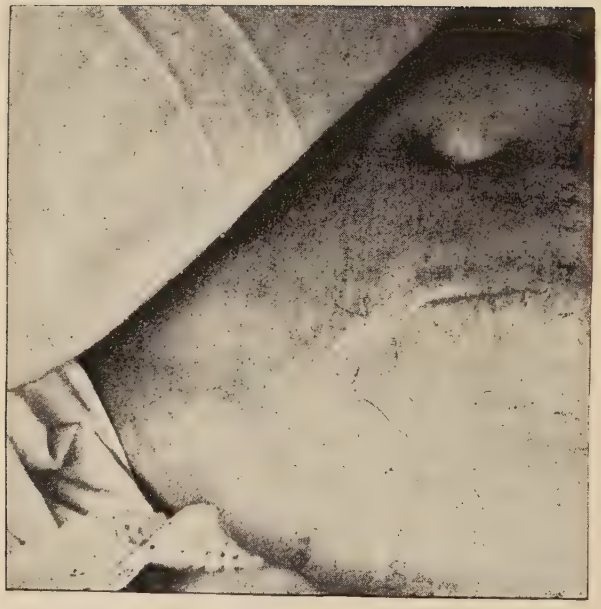

FIG. 12.—Incision 1¼ inches in length ten days after removal of appendix.

FOURTH DAY.

MORNING SESSION.

SEPTEMBER 8, 1893.

Dr. Robert T. Morris, of New York, in the chair.

The CHAIRMAN. The first business of the section this morning is the discussion of the papers of Drs. Price and Stone.

DISCUSSION.

Dr. A. Lapthorn Smith, of Montreal, Canada, said:

Mr. CHAIRMAN: I shall confine my remarks to a discussion of the paper by Dr. Price in regard to the most desirable method of removing the uterus for fibroid. The tendency of the profession at present is strongly in favor of the extirpation and the closure of the vaginal roof, and in the hands of certain operators the mortality comes down to a very low point. At the same time, I think that the extraperitoneal method of dealing with the stump is far safer. In the hands of those likely to have but few cases it would be madness to attempt Baer's operation, or any other requiring total extirpation. My own experience has been very limited, as I have had only three cases which required an operation; I treated the rest with electricity. I can show Dr. Price, or any one else, fifteen women in Montreal who were treated for fibroids by electricity, and they are well and rosy to-day. The three women whom I operated on were treated by the extraperitoneal treatment of the stump, and they gave me no anxiety whatever. We have been told that it was most unsurgical; that we were leaving a powder magazine in the pelvic cavity; but with the stump sewed to the lower angle of the wound it is shut off entirely from the peritoneum. While there may be sloughing, it is limited. There is no odor nor rise of temperature; but, even if there were, it does not follow that the peritoneum would be in danger from it. It is my habit to pare the stump down and bury it in boracic acid, and by this method I have had no trouble.

With regard to the intraperitoneal treatment of the stump, the record was a very sad one, Martin's mortality being 38 or 39 per cent by this treatment. My experience would lead me to enunciate this formula: that the majority of surgeons in this country who have to remove fibroids should do it by the extraperitoneal treatment of the stump. In the hands of men who have done several hundred operations total extirpation is the best method, but it is foolhardy for anyone not accustomed to the operation to attempt it.

Dr. I. S. Stone, of Washington, D. C., said:

Mr. CHAIRMAN: There is one point about Dr. Price's paper that struck me as strange. It seems to me to be remarkable for anyone to say he has found the perfection of treatment; he will hear of no change of method or procedure. We know that Tait has reduced the mortality in hysterectomy by tying off the broad ligaments, and when that is done three-fourths of Baer's operation is done. I do not see why surgery should be at a standstill, and I regard it as very exceptional for the extraperitoneal treatment of the stump to be advocated by an operator capable of doing total extirpation. If Dr. Price were to take a few cases and do the total extirpation, I am confident he would be satisfied with it. He would do it as well as he does everything, and he would do it as quickly. I regard the time element as far more important than any other consideration.

INFECTIOUS APPENDICITIS.

By ROBERT T. MORRIS, M. D., of New York.

The factors in infectious appendicitis may be grouped as follows:

(1) Histological: A thick layer of adenoid tissue.

(2) Anatomical: (*a*) A soft, distensible tube of mucosa and adenoid tissue within a confining outer tube of muscle and peritoneum; (*b*) lymphatics leading to the

lymphatics of the colon and mesentery; (*c*) veins leading to the superior mesenteric vein; (*d*) subperitoneal connective tissue investment; (*e*) peritoneal investment.

(3) Pathological: Mixed bacterial infection from the intestine.

ABSTRACT DESCRIPTION.

Appendicitis is an infectious exudative inflammation of the appendix vermiformis cæci, originating in any local cause for displacement of the guarding epithelium of the mucosa of the appendix, and progressing by bacterial invasion into the rich layer of adenoid tissue which is under compression.

Bacteria once having penetrated the adenoid tissue once remain there and develop for an indefinite period of time and with widely varying degrees of rapidity.

The natural course of the inflammation is protracted and marked by slow erosion of the mucosa and adenoid tissue, caused by the pressure of exudates and infiltrates.

A more rapid destructive process follows passive choking of the inner tube within the outer tube when exudation into the adenoid tissue is excessive.

The most rapid destructive process occurs when the muscular sheath, irritated to the point of spasm, contracts firmly down upon the swollen inner tube.

Incidents in the course of the disease are (1) infection along the lymph channels, from the appendix to the colon, causing typhlitis, paratyphlitis, perityphlitis, and cæcitis; (2) extension of thrombosis along the veins of the appendix, resulting in mesenteric thrombo-phlebitis, pyle-phlebitis, portal embolism, and abscess of the liver; (3) local peritonitis from direct infection of the peritoneal investment of the appendix; (4) general peritonitis from infectious thrombi in the veins of the portal system, and from poisoned peritoneal exudates; (5) local abscesses in subperitoneal connective tissue.

DETAILED DESCRIPTION.

The thin mucosa of the appendix vermiformis cæci is composed of a single layer of columnar epithelium cells. Beneath the epithelial coat is a layer of adenoid tissue, so thick that it often constitutes the principal mass of tissue of the whole appendix.

The layer of epithelium which guards the adenoid layer against infection is easily injured by foreign bodies or fæcal concrements in the lumen of the appendix, especially when violent exercise or a blow causes forcible impact of mucosa against such bodies. I believe that many acute attacks of appendicitis thus follow the efforts of parturition. The epithelial layer of the appendix is also rendered less resisting when the mucosa of the colon is inflamed from any cause. Thus, appendicitis is apt to occur as a complication of typhoid fever or dysentery or cholera, and it is, I think, common as one of the sequelæ of la grippe, although the New York Board of Health reports do not verify this belief. Nematodes and amœbæ coli are probably responsible for some cases of appendicitis, and tubercle bacilli open the gates for other infection. The mucosa and adenoid tissue are easily crushed, as by the efforts of the athlete, compressing his appendix between a full cæcum and the pelvic wall.

The mucosa may disappear in natural retrograde changes of the appendix (Ribbert). When once the epithelial guard has been broken, streptococci, staphylococci, and bacilli at once enter the exposed adenoid tissue very much as saprolegnia finds entrance to the tissues of a living fish at a point where the scales have been torn away. All structures of the appendix then become more or less distended with fibrin and serum, while leucocytes crowd the lymph channels.

If the process is a mild one, the mucosa of the appendix is gradually replaced by connective tissue. Necrosis of the adenoid tissue then progresses slowly from obstruction to capillaries and lymph channels, and an erosion of the adenoid tissue eventually bares the inner muscular coat of the appendix. Connective tissue next fills the gaps, the lumen of the tube is obliterated, and the disease is at an end; years, perhaps, having elapsed since its inception.

The appendix is usually supplied by a single artery. If proliferating endarteritis occludes the lumen of the solitary artery the result can be readily foretold.

The appearance of an appendix which is the seat of mild infectious inflammation varies according to the amount of exudates in its tissues. In some far advanced chronic cases the appendix is hardly firmer in texture or different in appearance from a normal one, and in all probability many a death trap of this sort has been replaced in the abdomen by the surgeon who, in response to the patient's symptoms, has made an exploratory incision and then failed to find what he expected to see. One can no more trust an appendix than he can an egg by external appearance. When exudates distend the tissue greatly the appendix is firm and tense like the erect penis of a child.

On making an incision through the outer tube in such a case, the inner tube bulges so prominently into the opening that one can readily understand how great has been the pressure. The inner tube then, being split, is usually found to be studded with minute punctate reddish dots and a few ashy necrotic specks upon its free surface, and it has a more pultaceous feel than a normal mucous surface. It is difficult for an untrained eye to discover by gross appearance whether any mucosa remains or not.

When bacteria have finally begun to poison the investing peritoneum of the appendix, exudates are thrown out from the surface of near-by peritoneum to wall in the offender, and absorption of bacterial products may be so rapid that the peritonitis remains quite local, and soon subsides, to reappear at some later period. This is an interesting phenomenon, and rather difficult of explanation unless we assume that increased production of poison is met by increased activity of absorbents of the peritoneum to a point of close compensation, and that the organized lymph, which remains in the form of adhesions, is not so susceptible to later poisoning as the original serosa, each mild attack of peritonitis having then a moderate tendency to protect against recurrence.

In more virulent cases a large mass of peritoneal exudate forms, and this becoming infected breaks down into pus or thin fluid, which is in turn walled in by more exudate furnished by the almost intelligent peritoneum.

In the most vicious cases the peritoneum is so poisoned at the outset that it loses control of itself and can not build coffer dams.

Bacteria may infect the subperitoneal connective-tissue layers and cause local "cellulitis" with resulting abscess, but this inflammatory process is by no means so common as it was supposed to be in the days when "cellular tissue" was thought to be a good descriptive term.

Thrombi form in the veins of the appendix and its mesentery in the mildest of cases, and these may go on to extensive mesenteric thrombo-phlebitis, with resulting general peritonitis, pyle-phlebitis, portal embolism, and liver abscess, in cases in which the appendix has not been held in suspicion at all.

The phenomena of infectious appendicitis vary according to the predominating species of bacteria in any given case, but the pyogenic streptococci and staphylococci do most of the wide infecting.

Violent cases of appendicitis usually attract attention directly to the real source of the trouble when the exudates and infiltrates cause sloughing of small or large portions of the inner tube by cutting off blood supply to small parts, or by choking the whole inner tube within the outer tube. At first the pain is reflected to various parts of the abdomen and there is general tenderness of the whole peritoneum, but at the end of twenty-four or forty-eight hours we can, as a rule, find the most marked tenderness at the point made classical by Dr. McBurney in the right inguinal region. We must not forget, however, that the appendix may be down in a scrotal hernial sac, or attached to the liver or to the left ovary. I have no explanation for the fact that the whole peritoneum is inflamed before the pain becomes localized, excepting on the hypothesis that the peritoneum needs to be pretty thoroughly irritated by poison before it resents the onslaught and walls in the intruder. The cæcum, distended by gas, may hide the tender point in the right inguinal region, and may even mask a large abscess or mass of exudate.

The most acutely painful symptoms occur in those cases in which the muscular coat of the appendix is excited to spasm, for when this happens the intestine contracts in sympathetic spasm at short intervals, causing the most agonizing colic. Fig. 8 represents an appendix which I caught in the act of spasm, and it explains why perforation is more apt to occur at the tip, the exudates in the tissues being crowded to that point, so that the knobbed tip is under great pressure.

Fig. 9 shows the same appendix immediately after the mesentery and muscular base of the appendix, with their contained sympathetic nerves, had been cut. In this appendix both longitudinal and circular muscular fibers were found to be fully developed clear to the tip, so that the case properly represents an ordinary one.

It is not improbable that the appendix sometimes cuts itself in two by irregular contraction of the muscular coat, just as an anneled or nereid, when held by one extremity, cuts itself away from the enemy. It is not an uncommon experience to come upon a separated appendix or portion of appendix when we are operating, but ordinary circumscribed necrosis may be responsible for this.

Next to the waves of colic, the most distressing pain occurs in the cases in which peritoneal exudates form a solid mass over the iliac arteries, the blow from the strong pulse there being equivalent to seventy finger pokes per minute against an inflamed abscess wall. If added to this the large nerves of the pelvis respond to irritation with neuralgia, the condition of the patient is deplorable. Infection from the appendix to the walls of the cæcum and colon in mild cases, or in the early stage of severe cases, may cause a constipation from inhibition of peristalsis, or a diarrhea from the irritation by ptomaines.

The infection may be so insidious as to cause perforating necrosis of the colon several inches away from the appendix, and in a case in which the appendix is to outward appearance almost normal. There is apt to be an area of thrombosed veins, however, extending between the appendix and necrotic bowel. The cases of infection at a distance from the appendix have been classified as typhlitis, paratyphlitis, and perityphlitis, according to the particular structure that was supposed to be involved, but, as a matter of fact, all structures of the bowel wall are usually involved at one and the same time, and it is not difficult, so far as my experience goes, to trace the infection to its focus at the appendix. I have not as yet, at operation, found any variety of typhlitis that did not evidently begin at the appendix. Sometimes infection of the bowel wall takes place by a short route at points where the tip of the appendix touches, but the bowel ordinarily becomes infected by progression of infection along the lymph channels in the loose submucous or subperitoneal connective-tissue planes.

Bilious vomiting, while not always present, is a characteristic symptom in all forms of acute appendicitis, and is probably due to a reversing of peristalsis at the duodenum by ptomaines absorbed by the peritoneum and excreted with the bile.

Relapsing cases of appendicitis—more properly called exacerbating cases—are, I believe, of four principal types.

(1) Cases in which the poisoned peritoneum of the appendix responds in various mild exacerbations of local peritonitis. Colic is not a marked feature of these cases, and the septic symptoms are unimportant.

(2) Cases in which the muscular coat of the appendix is excited to the point of spasm from time to time. Colic is the most salient symptom, but septicemia is neither severe nor persistent, excepting as a result of further complications.

(3) Cases in which small or large portions of the inner tube slough and cause well-marked septicemia until the sloughs have decomposed enough to escape into the bowel.

(4) Cases in which a chronic abscess cavity fills in exacerbation and empties by slow absorption at irregular intervals. Persistent septicæmia is the chief symptom.

I do not make a classification of perforating cases, because any appendix may perforate at any hour when exudates and infiltrates have caused a sufficient degree of

necrosis. Hydrops of the appendix and other odd results of appendicitis are self-explanatory. Exacerbating cases of appendicitis eventually come to an end by slow destruction of the mucosa and adenoid tissue, or by acute inflammatory disaster, or by surgical operation.

I am in favor of early operative treatment in practically all cases of appendicitis in view of the fact that the inflammation is so infectious in character. So long as the patient chooses to carry about with him a hive of bacteria, he knows not just when or where they will swarm. Moreover, every hour of progress of an acute exacerbation of appendicitis means increased damage to viscera, and the conscientious physician can not allow that for a patient who trusts him. Many cases of appendicitis run such a mild course for years that the patient is hardly aware of his trouble, and yet the mildest case may end in a disastrous exacerbation at any hour. The simple diagnosis of appendicitis I hold to be sufficient excuse for operation, and as soon as this stand is taken by physicians generally, the patients who would die from the disease under procrastinating treatment will be spared to their families and friends, to say nothing of saving time and relieving anxiety for patients who have exacerbations. I do not know how any other deduction can be rational.

I have adopted three distinct lines of operative procedure for the requirements of different sorts of cases, and employ three standard incisions.

My first is for cases not complicated by extensive adhesions or pus.

The incision is 1½ inches in length through the right linea semilunaris and all structures of the abdominal wall. It is sufficiently oblique to follow the natural trend of the external oblique aponeurosis. This very strong aponeurosis is, perhaps, the structure most worthy of attention in this vicinity. It must not be pulled away from its slight vascular connections with retractors, or sloughing will occur, and it must be closely sutured to prevent hernia. The incision having been made, the next step in the technique consists in finding a longitudinal muscular ribbon which labels the colon. This ribbon on being found is pulled through the incision until the appendix comes up on the end of it, like an eel at the end of a line, the rest of the colon being instantly replaced in the abdomen as fast as it emerges. The mesentery of the appendix is ligated with small catgut, and the outer tube is snipped through with scissors very close to the cæcum. The inner tube is then ligated with a strand of eye silk well down into the cæcum, and the stump of the inner tube cut short.

The peritoneum round about the stump is scarified until pink serum exudes, and then closed over the stump with three or four Lembert sutures of catgut. If the tiny ligature escapes for any reason it will go into the lumen of the bowel. The plan of simply ligating the stump of the appendix is undesirable for several reasons. In the first place, the ligature includes infected tissue, and perforation is quite likely to occur below the point of ligation. When the stump separates it may leave a troublesome mucous fistula if the abdominal wound is treated as an open one, or ordinary signs of perforation occur, if the abdominal wound has been closed. If the stump of the appendix heals nicely under ligature, it leaves a scar which is the weakest point in the intestinal tract; an "Esquimaux window" scar. For these reasons, I believe that the ligature will give place to the suture, or, better yet, to the combined suture and ligature, as described.

The small wound of the abdominal wall is closed with silkworm gut sutures which include peritoneum, transversalis fascia, and transversalis and internal oblique aponeurosis, knots being cut short to remain permanently. The external oblique aponeurosis must have its own tier of silkworm gut sutures. The skin incision is very prettily closed with fine catgut.

My second incision is for cases with extensive adhesions, but without pus or infected exudates. It is twice the length of the first incision, and the three-inch cut extends through the right linea semilunaris, as in the first one, and in the same direction. The patient is placed in Trendelenburg's position for this operation, so that we can work easily by sight with minimum amount of disturbance of viscera. The

wound of the abdominal wall is closed with four tiers of sutures: The first, of silkworm gut for peritoneum transversalis fascia, and transversalis aponeurosis; the second, for internal oblique aponeurosis; the third, for external oblique aponeurosis, and the fourth, of catgut for the skin. Each layer of aponeurosis must have a separate tier of sutures, for the reason that its muscle pulls in a separate direction from the others. The silkworm gut knots are cut short and left permanently.

My third incision, three times the length of the first one, is for cases with abscess or infected exudates, and is made over the point of greatest dullness in the inflamed area, no matter where that may be. The danger of infecting the peritoneum is thus lessened, and easy access is gained to the point where most work is to be done. The patient is placed in Trendelenburg's position, and we work by separating adhesions in a direction cephalad from the groin. By this plan of procedure each separate collection of pus escapes outward upon the abdominal wall, while adhesions yet remain cephalad and dorsad to protect the abdominal cavity. As a matter of fact, I have learned by experience to have little fear of pus in the abdominal cavity when it can be reached with saline solution and the drainage wick.

As soon as an abscess cavity is opened it is cleansed with fifteen-volume peroxide of hydrogen, and the septic cavity thus rendered harmless before adhesions are further separated. This is one of the most valuable points in the management of pus cases. The diseased appendix is finally removed and all adhesions loosened. If we rest content with evacuating abscesses simply, the diseased appendix remaining will cause septicæmia or further appendicitis, and adhesions remaining will bind the bowels in faulty position, so that the patient may remain an invalid perhaps for life. We shall have fewer and fewer of these cases as the advantages of early operation are gradually comprehended, and as the necessity for thorough work in desperate cases is appreciated.

If any pus or infectious material escapes into the abdominal cavity, we must wash it out with warm normal saline solution (approximately, ℥iss — Oij). This will not injure the serosa, whereas common water or solutions of chemical disinfectants are quite sure to injure the serosa and cause vexatious adhesions at least Common water introduced into the peritoneal cavity has killed many a patient a month or a year later. The peritoneal cavity is the one place in which antiseptics are unnecessary or positively harmful in surgery, but elsewhere throughout the operation an antiseptic technique can not be too rigid.

In the cases with pus or infected exudates the bowel is usually found to be infected and almost, if not quite, gangrenous in places. Such damaged bowel is sutured with seven-day catgut to the margin of the abdominal wound, so that when sloughing occurs later, or when intestinal contents are to escape, they will appear externally instead of intra-abdominally. The next step is the most important of all in badly infected cases, and it consists in the introduction of a wick of absorbent gauze as large as one's thumb, surrounded by gutta-percha tissue or protective silk, through which small holes have been snipped. The wick is placed with one end down in the pelvic cavity and the other end exposed externally, so that a large absorbent dressing placed over it will suck the peritoneal cavity dry, and keep it sucked dry. The absorbing dressing will sometimes require hourly renewal. An immense amount of offensive peritoneal fluid is discharged through this wick for about forty hours, and as soon as the discharges rapidly decrease the wick is removed. For further drainage we then depend upon osmosis produced by the introduction of deliquescent salts into the bowel. When the wick is removed, adhesions will have made a well into which we can pour peroxide of hydrogen until suppuration diminishes, and then the process of granulation can be hurried by the use of balsam of Peru.

My statistics in appendicitis cases to date, roughly classified, are as follows:

	Number.	Recoveries.	Deaths.
Cases without extensive adhesions, infected exudate masses, or pus	28	28	.....
Cases of extensive adhesions without infected exudate masses or pus	9	9	.....
Cases with infected exudate masses or pus	11	7	4

Two of the deaths were among my first cases, at a time when there was good authority for simply opening large abscesses and not separating adhesions or removing appendix remains. The abscess cavities were treated antiseptically, but both patients died of septicæmia—one a week after operation, the other about a month after operation. I now know that both patients probably had multiple abscesses. Two of the patients who recovered were treated in the same crude way. One had another attack of appendicitis a year later, and the other is an adhesion invalid in consequence of this bad surgery.

In all of the other cases all adhesions were separated and the appendices removed. By far the largest number of the cases were treated within the past twelve months, and among these two deaths have occurred—one from shock, in a case with pus and old firm adhesions binding damaged viscera together in a snarl. Resection of intestines should have been done immediately in this case, instead of tedious separation of adhesions. The other death occurred from acute obstruction of the small intestine a week after operation, when I happened to be out of reach. Judging from late experience, I feel that all of the 48 cases could have recovered under the technique which would now be employed.

Because of the great amount of interest recently shown by surgeons in appendicitis cases, there is a tendency on the part of some to cry "fad," and to quote the extravagance of ovarian surgery. There is, however, a marked difference between following a fad and suddenly awakening to the full appreciation of the fact that through all of the centuries we have been burying unnecessarily a certain class of patients. An inflamed ovary may be a very useful organ. It may yield to treatment, and it seldom threatens life except when it is the seat of important neoplasms or abscess. An appendix vermiformis, on the other hand, is always useless, and when infected is a direct and constant menace to life. Its bacteria can not disappear under medical treatment, though exacerbating symptoms may subside.

Appendicitis has recently been termed the "American disease." I doubt if it is more common here than in other countries, but fear that it may have been overlooked. This assumption is based upon the fact that physicians of my acquaintance, who had not made the diagnosis of appendicitis until recently, now find several cases of it in their practice during the year, and are able to call to memory cases which died under a different diagnosis in former years.

The following list of diagnoses had been made in cases in which at operation or at necropsy I found typical appendicitis lesions: Typhoid fever, la grippe, typhlitis, perityphlitis, paratyphlitis, cæcitis, intussusception, idiopathic peritonitis, salpingitis, ovaritis, gall stones, gravel, bilious colic, bilious fever, bilious peritonitis, malarial fever, psoas abscess, abscess of abdominal wall.

The specimens of appendices which I now present for inspection are not very dissimilar in outward appearance. The first specimen is normal, the second is one in which the mucosa is disappearing. In the third, the mucosa has gone and the adenoid tissue is disappearing. In the fourth, neither mucosa nor adenoid tissue remain, and connective tissue has taken their place.

Microscopic sections from these specimens, stained to show bacteria and the pathologic changes wrought by them, are here exhibited.

I have not, as yet, been able to secure a specimen showing simple catarrhal inflammation of the appendix, and believe that the term as ordinarily applied is a misnomer.

DISCUSSION.

Dr. Bernays said:

Mr. CHAIRMAN AND GENTLEMEN: Having been asked to discuss these papers I am placed in a very unenviable position, for the reason that the two papers have been exceptionally complete and exhaustive. Both of the gentlemen have attacked the subject from the only scientific standpoint, viz, the pathologic condition, and have attempted to draw scientific deductions from their examinations. Dr. Murphy's classification of the different forms of appendicitis is somewhat novel, and I have not seen in medical literature a classification comparing with his. Dr. Morris goes further, in that he takes notice of the bacteria which may give rise to the disease. It is an anatomical fact that we have in the appendix a soft, dilatable mucous canal inclosed in a harder, serous canal, closed at one end. Dr. Morris attempts to account for gangrene taking place so frequently by stating that it is the result of strangulation caused by the contraction of the outer tube. One of the photographs shows the apparent cause in one case to have been endarteritis. No doubt some cases are caused by endarteritis–endarteritis secondary to disease of the mucosa. The point about the strangulation of the inner coat of the appendix by the hard, unyielding outer one is a new point, and I am glad to have been present to learn this point. The mortality of Dr. Murphy's operations—out of 111 cases he lost 7, and of Dr. Morris's, 4 deaths out of 48 cases—is an extremly creditable showing

My own experience is about as follows: I have operated 63 times and have lost 10 patients. The practical rule which I wish to bring out strongly is this: When called out to see a case of appendicitis it is my first duty, which is imperative, to go immediately and operate, with this proviso: I ask a few questions of the attending physician. First, how long have you known your patient had appendicitis? Second, have you given opium or morphine? If the answer is that the patient has been sick a week or has been given opium or morphine, I say I am very busy, or advise that another surgeon be called. I do not like to perform ante-mortem post-mortems. Not to immediately give morphine or opium should be impressed on doctors. Do not give opium or morphine in the beginning of an attack of appendicitis or obstruction of the intestines. I know that a great deal of the mortality in my practice has been due to the use of these drugs before the operation. The use of opium after laparotomies is a very serious mistake; it should never be given after operations. I am often called upon to operate on habitual morphine users, but in my own practice, if I have a case of this kind, I place the patient in a hospital for some time and absolutely prohibit the use of opium or morphine for a week before I operate. This point about morphine may seem somewhat unsurgical, but I think it highly important.

Dr. J. Frank, of Chicago, Ill., said:

Mr. PRESIDENT: It has afforded me much interest to listen to the instructive and exhaustive papers of Drs. Murphy and Morris. Without going into details as to the causation of appendicitis I would divide these cases into two classes, septic and aseptic. Of aseptic cases I have had 4, and of these 4 every one had a fecal calculus. The operations were not performed by the usual route above Poupart's ligament, but by laparotomy. One of these cases I have had the pleasure of seeing one and a half years after the operation. She had been operated on three times; the first operation was done for cystic ovaries; the second was for appendicitis; and the third was for a pain over the gall bladder which I thought was caused by gall stones. In doing the second laparotomy I proceeded differently from the rest of the operators. I incised the peritoneum very far away from where I was going to amputate the appendix, pulled down the peritoneum as far as was necessary to reach the appendix, and then amputated the appendix. Of septic cases I have had probably 10 to 14. The only interesting case of these was where a perforation existed and where there was pus in the abdomen. In this case I introduced my finger and searched all around and thought I had cleared out everything, when I found a little opening from

which came another gush of pus. I provided drainage by making a counter opening in the lumbar region and introduced a drainage tube all the way through. The patient made a rapid recovery. Another case would not heal, and the patient was around the hospital for some weeks. I agree with Dr. Murphy as to the infrequency of finding a foreign substance in the appendix. I have never found a foreign body there.

Dr. J. H. Chestnut, of Philadelphia, Pa., said:

Mr. PRESIDENT: We have all listened with pleasure and profit to the papers of Drs. Murphy and Morris, as well as to the discussion which has followed. I have heard so much that I hesitate to add anything to what has already been said. I rise simply to suggest that in his future operations Dr. Murphy will carefully examine the appendix for minute perforations. He tells us that in cases of diffuse suppurative peritonitis without perforations he has found bacteria from the appendix. Now, it has occurred to me that it might be possible for Dr. Murphy's cases to have had a microscopic perforation through which the bacteria spoken of by Dr. Morris might have passed. Heretofore there has been no satisfactory explanation offered for the presence of pus in the peritoneal cavity. It seems not only unexplained, but inexplicable.

There was one point made by Dr. Bernays with which we all agree. There is no reasonable doubt as to the impropriety of administering opium or morphine before a laparotomy, but some of us have found occasional advantage in the use of morphine after an operation. I do not state this as a rule, but I have, with advantage, in some cases used opium afterwards, not before.

Dr. A. Lapthorn Smith, of Montreal, Canada, said:

Mr. CHAIRMAN: I rise to express my appreciation of these two papers by Dr. Murphy and Dr. Morris. I have never heard any papers which have given me such a clear idea of inflammation of the appendix as these, and many observations, previously obscure, are now made plain to me. I think I express the feelings of all when I say that I think both papers give a very clear and lucid description of the disease. I would like to ask the gentlemen if they have any suggestions to make on the subject of prevention of this disease.

Dr. Ernest W. Cushing, of Boston, Mass., said:

Mr. CHAIRMAN: I am in the position of the man who has had the disease. I had an attack of appendicitis nineteen years ago, and I shall never forget it; luckily it was not of the fatal kind. The main point is, shall we operate on nearly all cases, or shall we wait until the disease has declared itself, taking the chances that then it may have gone too far? In Boston most surgeons wait until they are sure the case is going to be a bad one, and that is why the mortality is so great. I do not believe that medicine has any effect on the disease; it is all self-illusion to trust to medicine. It has as much effect as the extract of tomcat's head, which our Chinese confrères use for so many diseases, with, as they think, so satisfactory results. The cases where medicine works well are those where either there is no appendicitis, or the case is a mild one, without gangrene, without suppuration, so that the patient will get well in any case. No medicine will cure bad cases; they will surely die unless relieved by early operation. I emphasize the word *early* operation; after general peritonitis has been set up operation is of little or no use. To be sure, late operations will save a certain number of cases in which the process is fenced off by adhesions, so that an abscess is formed which is circumscribed and can be opened later. Now, although it is easy from the beginning to say that some cases are grave, I do not believe that any man can declare in the early stages that a case, apparently mild, will not become grave later on. Who can tell whether there is an impaction of a foreign body in the appendix? Who can tell whether perforation can occur, and when? Be assured of one thing—without operation there is a frightful mortality. Instead of saying that the disease is not so bad after all, for two-thirds of the cases get well without operation, under medical treatment, we should say that the disease is a horrible one, for one-third of the cases die in spite of treatment. It is

trifling with human life to dare to wait inactive to see in which category any given case belongs. Imagine the feelings of the patient, as the poor wretch lies wondering whether he will be one of the third who die or of the two-thirds who recover, while he thinks of leaving his little family, and wonders if his life insurance policy will be paid, while the unhappy wife busies herself with making poultices, and tries to keep the children quiet, and ever appeals to the doctor for comfort. And how can the doctor comfort her? By assuring her that more than two-thirds of the cases recover, perhaps even three-quarters, and by industriously making three or four visits a day, until by good luck the patient gets better, or until the crash comes and within a few hours, or perhaps a few minutes, the patient dies, and the doctor may bow himself out.

Dr. Eliza M. Mosher, of Brooklyn, N. Y., said:

Mr. CHAIRMAN: The question of the causation of appendicitis is a most important one. A patient of mine, much troubled by constipation, was advised by a friend to take a large enema of warm water, with the body reversed. She injected two quarts or more, and then, lying on her back, rubbed the abdomen from left to right. She was immediately seized with acute pain in the right iliac region, and a sharp, well-defined attack of appendicitis followed, which subsided, however, after reaching the point where operation seemed inevitable. She gave a history of two previous attacks of inflammation in the same region. It would seem that there was a connection in this case between the flushing of the colon, the manual pressure, and the attack of appendicitis.

Dr. Murphy, in closing the discussion on his paper, said:

Mr. PRESIDENT: The fact that there are a number of cases which get well without an operation is not a good argument against operating in the majority of cases. I had one case who had been in the hands of twenty-one doctors, and everyone cured him, but finally I had to operate. They had 21 cures to my 1. It must not be forgotten that we may sometimes find the cæcum far out of place, for I have found it away around on the left side. Dullness on the surface is not to be relied on. Deep percussion brings out tympanitis from the distended bowel, while superficial percussion brings out dullness of pus on top of the bowel. Pus or gangrene has been the cause of about 99 per cent of my cases.

Dr. Morris said, in closing the debate:

Mr. CHAIRMAN: Dr. Bernays has asked if we often have mesenteric endarteritis with appendicitis. In the case mentioned by me, and to which he refers, the patient had none of the diseases conducive to endarteritis, but had had a mild attack of appendicitis a long time. It may be the result of absorption of ptomaines in the appendix. I have not yet found a case of catarrhal appendicitis, although I have had several assistants looking for it for some time.

I regard opium as a dangerous drug, and it is a wicked thing to use, but opium quiets restlessness after the operation, and a very little is allowable the first night if you can open the bowels the next morning. I hate the sound of the name of opium.

Dr. Smith asks if there is not some method of preventing an attack of appendicitis. I answer that the removal of constipation will be the removal of one of the dangers of appendicitis. If the cæcum be loaded with fecal matter it will crush the mucosa. The direction of the bowel is always opposite to that of its peristalsis, which may be determined by touching the intestine, and then by following the bend of the colon you will find the appendix.

A PLEA FOR THE EARLY DIAGNOSIS AND PROMPT ELECTRICAL TREATMENT OF FIBROID GROWTHS OF THE UTERUS.

By G. BETTON MASSEY, M. D., Philadelphia.

The questions briefly considered in this paper are the nature and symptoms of the early manifestations of uterine fibrosis and myomatous new growths; the duties of the profession in making a prompt diagnosis and instituting early treatment for

the condition, and a consideration of the value of the Apostoli methods in these cases.

The etiology of fibroid growths within the uterine parenchyma is still obscure, but enough is known of fibrosis in general to show that it is an hypertrophy of the connective tissue elements, or, in the case of myomas, of the uterine parenchyma itself. According to the classification laid down by Loomis in his discussion on Fibroid Processes at the Congress of American Physicians and Surgeons at Washington in 1891, the process under consideration is probably somewhat distinct from that found in ordinary inflammation, though allied to it, and is dependent on a perversion of the nutritive supply rendering it insufficient to maintain the higher elements, the connective tissue cells, which maintain a lower nutrition, going on to hyperplasia. Accepting this definition, the disease is essentially an affection of the local trophic processes.

Arising in a disordered condition of the trophic nerves of the uterus, uterine fibrosis may either be found associated with chronic interstitial metritis, or else simulating this affection by the production of similar symptoms in the early stages of the growth of the buds. Interstitial fibrosis, in fact, is not clearly distinguishable from the later stages of chronic metritis, at least clinically, and under the designation of hyperplasia may be considered as one of the conditions to which this paper invites the attention of physicians. The brawny, cartilaginous, enlarged organ becomes almost a foreign body within the pelvis. There may be lacerations of the cervix remaining also as evidence of the causative conditions, but the disease now present can not be cured by their repair. Such efforts are too much like locking the stable door after the horse is stolen. A more healthy tone must be imparted to the depressed trophic nerves of the organ in order that the normal histological elements may be stimulated into renewed life.

Cases in which the fibroid growth is in the shape of isolated foci of development surrounded by normal uterine tissue are more important, as it is this form that results in the progressively increasing neoplasms that at times attain enormous proportions and give rise to much suffering. Beginning as small nodules in various portions of the uterine wall, the greater number of these cases present symptoms in their earlier stages that should attract the attention of the physician, but too often they are mistaken for ulceration, metritis, displacements, and even ovarian disease. Cases are at times supposed to be suffering from oöphoritis or salpingitis when the trouble is really a fibroid bud springing from the side of the uterus in the region of the broad ligament. The diagnostic aid to be derived from a supposed locating of a tender spot is extremely unreliable. Many a tender ovary may be cured by treatment directed to the uterus, and *vice versa*.

I have repeatedly called attention of late to these interchangeable evidences of uterine trouble and oöphoritis, showing that many so-called cases of ovarian disease were really instances of catarrhal and interstitial metritis, and it has been while pursuing the treatment of some of these by the intrauterine method that still further revelations have been made. An enlarged uterus, which had given rise to symptoms that had been referred to the ovaries by surgical friends, with the natural consequences as to advice on their part, on being placed under the intrauterine galvanic treatment would shortly present a shrinkage everywhere but at one point. Here a nodule could now be detected which had been concealed before by the general uterine hyperplasia. Under a continuance of the same treatment I have several times had the satisfaction of seeing the lump grow smaller, coincident with a disappearance of the symptoms, demonstrating that I had not only stumbled upon an incipient fibroid growth of the organ, but had also relieved the patient from a most unpleasant future.

About 75 per cent of my cases give a history of having been treated for some form of womb disease, for varying periods, before the recognition of the tumor. It is safe to say that nearly all of these had nodules present throughout their trying experi-

ences with tampons and pessaries, and had a proper diagnosis been made could have been saved years of subsequent suffering.

It should be stated, however, that a certain proportion of these cases can never be recognized before their emergence from the pelvis, particularly when occuring in maiden ladies and unaccompanied by pressure symptoms or pain. An instance of this came under my observation quite recently in which a professional nurse, who had been under my care for some time for an affection that did not require examination of the pelvis or abdomen, suddenly discovered that she had an interstitial fibroid nearly as large as her head, extending to within an inch of the navel. It was too narrow to cause pressure, and though extending so far above the pelvic brim, had not been noticed by her, as the abdominal walls were naturally firm and rigid. An increasing tendency to hæmorrhagic periods was the only symptom. Several other cases with a similar history have been seen by me, but they are exceptional. The usual history, if carefully inquired into, will show early signs of the impending condition which should be ample warning to the watchful physician.

The discovery that painful periods, or particularly that intermenstrual pain, weight, and discomfort, are associated with an enlargement of the uterus, should lead to a more thorough investigation of the case to determine the presence or absence of fibrosis. Now that an almost certain relief may be obtained from electric treatment, there is no longer any excuse for a waiting policy that not only prolongs the discomfort of the patient but renders treatment, when finally undertaken, both more tedious and more difficult.

A considerable experience in dealing with fibroid tumors brings me constantly into contact with evidences of delayed attention to these cases. Case after case is referred by physicians for treatment only after the growth is so large as to be a deformity to the patient. Five per cent of my cases were the wives of physicans themselves, and in each one of these the growth was nearly as large as the adult head. Certainly no greater proof could be exhibited of the expectant attitude of the profession towards the earlier manifestations of uterine fibrosis.

The most reasonable explanation of the effect of electricity on these growths is that it acts as a trophic stimulus to the tissue, arresting the cell metamorphosis in the tissues in which the fibrosis arises, and stimulating the absorbents to a quickened removal of the products of the arrested process. The too-prevalent impression that a destructive electrolysis is necessary to dissolve the morbid tissue is untenable, as my best results have not always been attained after the strongest currents have been used. Considerable currents are usually required, it is true, but only because a concentrated current is essential to bring the seat of trouble under the alterative influence of an efficient current density.

A careful collation of my statistics of early cases treated by the Apostoli methods shows that every one, without exception, was arrested in its further growth, and a considerable proportion either reduced in size or completely absorbed. As these cases have been under observation for periods of time varying from one to six years, an ample opportunity has existed for relapses and renewed growth. An incipient fibroid is peculiarly well adapted to receive the full effect of electric applications within the uterine cavity as compared with a larger growth, since its center of development is more readily brought under the full influence of the current. An additional advantage in the early diagnosis and treatment of these cases is the certainty that all, or nearly all, discovered in this stage are amenable to electric treatment. The tumors that are not amenable to electricity are usually those that have had years of growth and neglect in which to become cystic, or which have developed purulent collections within the tubes. The mere presence of periuterine inflammation about the tumor is by no means a contra-indication; but the presence of a purulent collection within or in the neighborhood of these neglected cases is a distinct bar to a method that doubtless would have been an effectual remedy in the early stages of the affection

CONCLUSIONS.

(1) The early signs of uterine fibrosis are quite similar to those of a number of more common disorders, and are consequently mistaken for them in many instances. Whenever metritis, displacements, or persistent sensations of pain and weight are found the physician should bear in mind the possibility of the cause being an incipient fibroid development, and if found to be so he should place the patient at once under treatment.

(2) The most recent views of the etiology of fibrosis indicates that the mode of action of electricity is most likely by a stimulation of the trophic and sorbefacient functions of the uterus, rather than by an electrolytic destruction of the growth.

(3) The expectant policy in dealing with fibroids is too prevalent, resulting in many cases losing the decided advantage to be derived from early treatment.

(4) The early diagnosis of fibroid growths has the advantage of placing all cases within the list of those that are amenable to electrical treatment, while delay permits of some becoming unsuitable for it.

(5) All forms of fibrosis and fibroid neoplasms of the uterus are suitable for electrical treatment, except those that have undergone cystic changes, or that are accompanied by purulent accumulations in the uterine adnexa.

HABITS OF POSTURE A CAUSE OF DEFORMITY AND DISPLACEMENT OF THE UTERUS.

By ELIZA M. MOSHER, M. D., Brooklyn, N. Y.

The influence of habits of posture upon the shape of the chest and the healthful development of the lungs has long been understood.

Their influence in the production of spinal curvatures is well known. It has been a common practice from the earliest times to elevate an inflamed part, and otherwise limit or utilize the force of gravitation in the treatment of medical and surgical cases.

Long before the time of Marion Sims the gynecologist and obstetrician had learned to some extent the utility of certain postures. In the light of all this knowledge it seems strange that so little should be known to-day in reference to the influence of habits of posture in the causation and maintenance of deformities and displacements of an organ so movable, and in itself so helpless to resist the forces of gravitation and pressure from surrounding structures, as the uterus.

The human body, viewed from the standpoint of its mechanics, consists of a central arch or pedestal—the pelvis, which supports a perpendicular superstructure, the trunk. Because the pedestal is subject to movement upon its axis, the superstructure to maintain an equilibrium must be flexible, and this flexibility is attained by the spinal column, made up of many segments, by ribs articulating with it, by flexible costal cartilages, and by soft abdominal walls.

The trunk supports three weights which are attached to its summit, viz, the arms and head. Upon the position of the pelvis below, and the adjustment of these elevated weights, the shape of the spinal column in health mainly depends.

The pelvis rests upon its ischia, or upon its column-like supports, the legs at an angle more or less oblique, in which position it has the power to rock backward and forward, and from side to side.

The absence of bony landmarks posterior and anterior upon the same plane of the pelvis makes it difficult to measure its actual angle of anterior inclination. The prominence of the spinous process of the last lumbar vertebra, and the upper border of the symphysis pubis, are points which have been chosen by a good many from which to make measurements. Others, myself among the number, have preferred to measure from the sacro-vertebral articulation, a point easily found by

placing a rule with sliding bar firmly across the crests of the ilia and measuring downward an inch. Somewhere very near this point the depression which indicates its location is easily felt, especially if the individual to be measured bends backward or forward. The angle with the vertical, formed by measuring from these points, has been termed the "angle of obliquity of the pelvis." Movement upon its axis laterally may equally well be called "lateral obliquity of the pelvis," adding for the sake of distinction, the words "right" and "left."

The normal position of the pelvis with the body in equilibrium in the upright is without doubt, that degree of obliquity which is necessary to place the bony arch of the symphysis pubis and the lower anterior abdominal wall beneath the weight of the abdominal viscera. In this position, when there is no lateral inclination, the pelvis supports the spinal column and all the structures connected with it, not only in symmetrical position, but so placed that only a minimum amount of muscular force is required to maintain them in equilibrium.

Within the pelvis the uterus poises obliquely upon the summit of the vagina, where it is steadied by its lateral ligaments. These, by their broad insertion into the middle of its body, and their firm mooring to the bony wall of the pelvis, are well calculated to maintain it in this, its most permanent position. Loops of intestine dangle around its fundus, but with the pelvis at a normal angle they do not act as weights upon it. A full rectum or bladder rocks it forward or backward temporarily; muscular movement and readjustments of the upper weights so change the shape of the trunk as to cause this loosely placed organ to make more or less wide excursions, from which, however, if it be in a healthy condition gravitation brings it back, provided the pelvis retains or regains its normal inclination.

What figures represent this normal angle of obliquity? In looking up the literature of the subject I find that the first recorded measurement on the living subject was made by John George Roederer in 1751, but his results are not made known; from his time to the present more than fifty observers have measured this angle, and have given averages which range from 20° to 75°. Some mention the points from which measurements were taken, others do not. As the angle varies according to the elevation from which it is measured these statistics are of little value to us in this study of the subject. Schröter, in an article (Geburtshülfe, Bonn, 1888) quotes Herman Meyer as saying that "the inclination of the pelvis varies very much in the same individual in the standing position, depending especially upon the degree of abduction and rotation of the thighs." That much depends upon the position of the legs in standing is proven by the fact that a variation of 20° can easily be made in the inclination of the pelvis, by first placing the legs firmly in extension (with the calf muscles strongly in action) and then relaxing until the knees become slightly bent beneath the trunk.

In order to obtain measurements of the pelvic obliquity in healthy women, and in those suffering from uterine disease, for purposes of comparison, it was necessary to invent an instrument, as there was none in this country. The one which I have used for the statistics which accompany this paper was devised by Dr. Fred Baker, of California, and myself. As is often the case, the first one made proved unwieldy, although its markings were practically correct.

For assistance in planning the more perfect instrument, which I here present, I am indebted to Dr. R. L. Dickenson and Dr. B. B. Mosher, of Brooklyn. For its careful construction, to Mr. Julius Pfarre, of Messrs. Tieman & Co., New York. I have taken the liberty of naming it a "Pelvic-obliqui-meter." It consists, as you see, of an upright beam attached to a solid horizontal platform, upon which the patient stands. A sliding mechanism within this upright permits adjustment to the varying height of individuals. The latter mechanism carries a pair of caliper-like arms, the posterior of which is stationary. The anterior arm has a sliding hinge at the back to permit of easy application to the symphysis pubis. A simple form of vernier attached at the point of junction of the two arms marks the angle of obliquity. With it I have measured the pelves of 43 women between the ages of 16 and 70 years,

using as landmarks the sacro-lumbar articulation and symphysis pubis. Of this number 18 gave no history of pelvic disease, either functional or organic. The remainder had suffered from some form of pelvic disturbance from two to twenty years. Those in the first class habitually stood with knees firm, in the position represented by figures 1 and 4, in Plates III and XX of Kellogg's Outline Studies, which is practically the military position for men. Pelvic obliquity in standing in these cases ranged from 37° to 48° (*see* tables appended). Their sitting posture was observed to be equally upright, although it was not measured. Of the remaining number, 16 had retrocession and retroversion uteri, while 6 had anteversion or anteflexion. Those suffering from retroversion, with its attendant limitations, without exception habitually held the pelvis at an angle between 25° and 30°, rolling it still further back in sitting. They stood habitually with knees relaxed and had poorly developed calf muscles. In searching their history to find whether this habit of posture was acquired as a result of the pelvic discomfort, or otherwise, it was found in a number of instances that the patient was able to recall, having been criticised in early life for projecting the abdomen forward. One who had suffered upward of twenty years (during six of which she had worn a pessary) said she "had been ridiculed by her family all her life because she had poked out her stomach." It would seem, therefore, that the condition was the result, although it might in some cases have been the cause, of this habit of posture. Six women had anteversion or anteflexion uteri. In these cases the pelvic obliquity ranged from 29° to 33°. A digital examination made per vaginam, with the patient standing in her habitual position, discovered exaggerated intra-pelvic pressure in all cases where the pelvic inclination was below 33°, which increased and moved backward as the angle decreased. If one of these patients was placed for a few moments in the modified "knee-chest position" (with abdomen well supported) to drag the intestinal loops out of the pelvic cavity, and then examined with the pelvis at 38°, the intra-pelvic pressure was not observed. It returned slowly, however, when the habitual angle was again regained.

Let us for a few moments consider the mechanical changes which accompany an abnormal lessening of the angle of obliquity of the pelvis.

The spinal column loses a portion of its anterior lumbar curve, which makes room for the abdominal viscera to drop backward in this region. The symphysis pubis rotates outward and upward, taking a position upon a plane with or in front of the ensiform cartilage. This movement lessens the distance between the origin and insertion of the recti muscles, thus in time weakening their power of contraction; at the same time the inclination of the abdominal wall is so changed that intra-abdominal pressure takes a direction (without the aid of pressure from the corset steel) downward and backward instead of downward and forward. The result of this is to push the contents into the upturned inlet of the pelvis instead of in front of it, upon the firm bridge of pubic bones made for its support.

When we think of 16 or 18 feet of small intestine, more often than otherwise weighted with the products of an imperfect digestion and distended by gas, swinging upon a relaxed and lengthened messentery and crowded into the pelvis not only by gravitation, but by abdominal and corset pressure from above, we easily recognize the cause of the increase of intra-pelvic pressure observed in the cases described.

But what about the uterus itself in a pelvis held at an angle of 25°? The force of gravitation strikes its fundus at a point posterior to that which is normal, swinging its weight backward and downward, thus changing the relation of its summit, to the vagina, much as we have seen the relation of the abdominal viscera to the inlet of the pelvis changed.

This backward movement, or retrocession may be the only change in the position of the uterus, caused by this lessened obliquity of its bony case. It is likely, sooner or later, however, to move still farther from its normal place, or to become molded into a new shape by the pressure from above. Temporary increase in its

weight (after childbirth), relaxation of its supports due to general anæmia or an acute illness, and many other causes favor such a change. The shape and position which it shall assume depends upon the angle at which the superimposed weight impinges upon it, and the direction in which gravitation draws it. The schoolgirl at her books rocks the pelvis backward to an angle of 23° and then encroaches still more upon the space for the abdominal viscera by dropping the weight of arms and head forward; at this age normal invagination of the uterus may not yet have become complete, hence the cervix, closely fastened to the pubis, moves upward and forward with it, while retrocession of the body occurs. Can it be otherwise than that pressure from above shall mold the fundus into the shape which we so often recognize later, as forward, backward, or lateral flexion?

The shop girl stands in this position all day. The seamstress sits in it. The housekeeper alternates standing with sitting. In all, the increase of weight in the uterus during menstruation exaggerates the strain. Retroversion uteri seems to be the more common lesion produced by this habit in the adult, especially when the obliquity of the pelvis is lessened to 25° or even to 29°. When it measures 30° or 33° anterior positions of the fundus seem in the few cases I have studied to obtain.

What are the causes we ask ourselves which tend to produce the habit of rolling the pelvis backward. Of 10 girls under 16 measured by me 6 had well developed calves, showing that they had stood habitually with the knees firm and walked with energy. These girls without exception held the pelvis at an angle above 33°. The remainder had soft, small calf muscles, and evidently had a habit of standing with bent knees and walking with leg muscles weakly active. Nearly all of the latter number carried the pelvis at 33° or below. Bent knees in standing mean relaxation of the muscles which hold the pelvis at its normal angle of obliquity. Hence I place as a first underlying cause, a lack of training in childhood into right habits of posture in standing.

Articles of dress, which by their weight and in other ways, fatigue the legs, favor relaxation of muscles. High-heeled shoes make it impossible to stand with knees firm; hence their influence in lessening pelvic obliquity. Tight waistbands and more than all the corset steel, which as it bends, makes its greatest pressure upon the soft abdominal wall in the region of the waist line; approximation of the anterior body line to the posterior moves backward the center of gravitation proportionally, and in this central region of the upright column it especially tends to unbalance the body; the latter, however, regains its equilibrium by throwing the pubis upward and outward, and the weights attached to the upper region of the trunk forward and downward. The posture is a familiar one and is well shown in Kellogg's Outlines. The seats provided for children and adults, from the infant rocker and the schoolroom seat to that of the lecture hall and church, are all responsible in a large measure for this habit in sitting. It is impossible in by far the larger number of such seats to place the pelvis at the normal angle and at the same time use its back to support the shoulders. Luxurious cushions and soft upholstery tempt the pelvis into positions unknown to our erect grandmothers, whose hard seated straight-backed chairs, alas! we have learned to regard as instruments of torture. Indoor sedentary lives in overheated houses and schoolrooms and many similar wrong conditions (which it is the duty of physicians as guardians of the public health to correct), tend to favor habits of posture which it would seem have a more potent influence than we have heretofore recognized in the production of pelvic diseases in women.

In its normal position the pelvis occupies a horizontal plane, with no lateral angle of obliquity. Sitting upon one ischium or standing upon one foot produces a lateral inclination, which, if allowed to become habitual, has power to change to some extent the shape of the entire body. The scope of this paper permits a study only of the influence of this position upon the organs of the pelvis.*

* For a further development of this subject see author's paper on "The influence of habits of posture upon the symmetry and health of the body," Brooklyn Medical Journal, July, 1892, and "Habitual posture of school children," Educational Review, New York, October, 1892.

With the pelvis in "lateral obliquity," the superimposed trunk retains its equilibrium by throwing its upper weights (arms and head) toward the elevated side. By this movement the spinal column is made to take a long lateral curve, with slight rotation upon its vertical axis. The shoulder, hip, and ribs approach each other, shortening the body line and encroaching upon the space within the abdomen in that region. Opposite conditions obtain upon the side which is unsupported. The contents of the abdomen move downward and toward the latter, carried by gravitation and mechanical pressure. Loops of intestines crowd into the pelvis upon that side and against the uterine fundus, prying it out of the place to which gravitation alone would carry it, and over toward the side where there is least pressure. The broad ligament upon the lower side is stretched and pressed upon, while the other tends to grow short from disuse. The ovaries receive their share of ill treatment and suffer accordingly. As these changed conditions become permanent, we should expect the circulation of blood through the organs of reproduction to be interfered with, since all the vessels enter and find exit from the uterus at its sides, in close relation with the insertion of the broad ligaments. Upon the short side they should become overtortuous in their journey to the organ, while upon the other they should straighten out abnormally because the distance which they are obliged to travel is lengthened. Neither of these conditions is conducive to free movement of the blood current. The obstruction thus presented is exaggerated during the menstrual engorgement and therefore it would seem that we might count it among the causes of dysmenorrhœa, and especially of that form wherein without evidence of organic disease of the ovaries, pain is habitually referred to the lateral region of the pelvis.

I have examined, per vaginam and per rectum, a large number of women and girls who have acquired a lateral obliquity of the pelvis from habits of posture, and in almost no instances have I found the uterus in the axis of the pelvis.

In the 42 cases (notes of which I have taken) 22 had a right lateral obliquity (right hip elevated) while the remainder had acquired the opposite tilt. In every one of these cases the uterus approached the elevated hip, especially in the upright position of the trunk. Most of these women had dysmenorrhœa and leucorrhœa, and in some the condition was accompanied by more serious pelvic lesions. A combination of the two forms of obliquity in the habitual posture of the pelvis is quite common (especially when the habit has been acquired in standing) and the influence of both can be traced, in the shape and position of the uterus. If we admit that certain habits of posture have the power to increase abnormally, intra pelvic pressure, and predispose women to deformity and displacement of the uterus it becomes our duty, it seems to me, to decide upon the best measures which can be taken to do away with this widespread and far-reaching cause of ill health in women.

Since prevention is easier and more economic than correction, the work should begin in the home and in the school room. Mothers in every school district should collectively be instructed in reference to the normal position of the body, in standing and sitting, and the danger which menaces their daughters if not properly trained. Teachers everywhere should be taught the same thing and required to enforce the adoption of right habits of posture in their pupils. Physical exercise, not only in the gymnasium but in the school room between classes, should be given to strengthen the muscles which hold the pelvis in normal obliquity, and which correct the tendency to lateral obliquity. A physical director (preferably a woman) should be employed by the school board of every city to measure the pelvic obliquity of all of the girls in the public schools from time to time, so as to place those who require it under special training, which should be continued until a right habit of posture has been acquired. Physicians and all intelligent people should exert an influence against the use of articles of wearing apparel by girls and women which engender bad habits of posture, most important of these being high heels, the corset steel, and tight waistbands. School and lecture room seats and chairs in general should be constructed in such a manner as to aid rather than hinder the body in its efforts to maintain an equilibrium in healthful positions. It is hardly necessary

in the light of the facts here presented to remind the gynecologist of the importance of training patients into right habits of posture before beginning treatment for disease of the uterus and ovaries. Nor can we wonder at the failures we have been forced to record in the treatment of flexions, versions, and prolapsus of the uterus, when we remember how we have disregarded this important factor in their causation.

I hope the time is not far distant when a systematic use of the "pelvic obliquimeter," accompanied by corrective exercise during girlhood, will obviate the present necessity for the frequent use of the speculum and the surgeon's knife for the relief of conditions within the pelvis, which interfere with the health and happiness of so many women.

Measurements of pelvic obliquity in women suffering from deformity and displacement of the uterus.

No.	Age.	Condition.	Occupation.	Height of body.	Breadth of pelvis.	Exaggerated intra pelvic pressure.	Prolapsus uteri.	Anteflexion.	Retroflexion.	Retrocession.	Retroversion.	Anteversion.	Prolapse of one ovary.	Prolapse of both ovaries.	Obliquity of pelvis (habitual posture).	Remarks.
				Inches.	*Inches.*										°	
1	22	S.	Sewing	64	.....	1	...	...	...	1	1	...	...	1	29	
2	25	S.	Shop	62	.....	1	...	...	...	1	1	...	...	...	27	Pain in sacral region since beginning of menstruation.
3	49	M.	House	61.25	.....	1	...	...	...	...	1	...	...	...	27	Examined by Dr. Sims 15 years ago; has been under care of several noted gynecologists.
4	37	S.	Teacher	64	10.75	...	...	...	...	1	1	...	...	...	30	
5	37	S.	Sister of the poor.	66.5	13	1	...	...	...	1	1	...	...	...	29	Discomfort, dragging in sacral region several years; lifted dead body; pain began immediately.
6	25	S.	Service	63.75	11.75	1	...	1	...	...	...	...	...	...	25	Pessary 6 years ago.
7	38	S.	Dressmaker.	62	.....	1	...	...	...	1	1	...	1	...	25	Many years of pain and discomfort.
8	40	S.	Service	62	12.5	1	...	...	...	1	1	...	...	...	27	Pain in sacral region 5 years, especially during menstruation.
9	15	S.	.....	63.5	11.25	1	...	...	...	...	...	...	...	...	25	Leucorrhœa; dysmenorrhœa; general congestion of pelvic organs.
10	60	M.	House	63.75	.....	1	...	...	...	1	1	...	...	...	25	Menopause 6 years; pain and dragging in back most of time 20 years; pessary many years.
11	25	S.	.....	60	11.25	1	...	...	...	...	..	1	...	...	31	
12	41	M.	House	61.75	11.75	1	...	...	...	1	1	...	...	...	29	Has worn pessaries of all shapes and sizes; hard to keep them in.
13	38	S.	.....	.....	.....	1	...	...	...	...	...	1	...	...	30	General anæmia; much headache.
14	24	S.	.....	63	10.25	1	...	...	...	1	...	...	1	...	29	Painful menstruation.
15	38	M.	House	64.5	10.25	1	...	...	...	1	1	...	...	...	25	History of inflammation after birth of child; uterus adherent posteriorly; long continued discomfort.
16	37	M.	Washing	61	11	1	...	...	...	1	1	...	...	...	31	No pelvic symtoms; constant headache.
17	39	S.	Shop	64	12.25	1	...	...	...	1	1	...	...	...	30	Used to stand, walk, and sit braced backward; position corrected; ovarian inflammation; removal of ovaries; great mental distress.

Measurements of pelvic obliquity in women suffering from deformity and displacement of the uterus—Continued.

No.	Age.	Condition.	Occupation.	Height of body.	Breadth of pelvis.	Exaggerated intra pelvic pressure.	Prolapsus uteri.	Anteflexion.	Retroflexion.	Retrocession.	Retroversion.	Anteversion.	Prolapse of one ovary.	Prolapse of both ovaries.	Obliquity of pelvis (habitual posture).	Remarks.
				Inches.	*Inches.*										°	
18	66	M.	House ..	62.5	11.75	1	...	...	...	1	1	...	...	...	26	Pelvic discomfort 20 years; pessaries innumerable; intra pelvic pressure continues.
19	22	S.	.....	63.75	11.25	1	...	1	...	1	...	...	...	...	29	Pelvic pain since age of 17; habitual school posture with pelvis rolled backward; lateral obliquity marked.
20	20	S.	.....	63.75	11.25	...	...	...	...	...	...	...	...	...	37	Formerly rolled pelvis backward; was very miserable from constant discomfort in pelvis; corrected; is well.
21	44	M.	House ..	64	11.25	1	...	...	1	1	...	...	...	...	25	Pain in pelvic region since early life; examined 10 years ago; diagnosis, retroversion uteri; condition continues.
22	24	M.	...do	61.5	11.25	...	1	...	...	...	1	...	...	...	31	Out of health 3 years; miscarriages.
23	23	S.	.....	64.5	11.25	1	...	...	...	...	...	...	...	...	29	Under my care 8 months; general congestion of organs; no relief until position was changed; under treatment.
24	24	M.	House ..	67.5	11.75	1	1	...	...	...	...	...	...	...	31	First symptoms appeared after attack of typhus fever.
25	32	M.	...do	61	12	...	...	...	...	...	...	...	...	...	34	Anteversion present many years; intra pelvic pressure extremely well marked.

Measurements of pelvic obliquity in women who have never suffered from pelvic discomfort.

No.	Age.	Condition.	Occupation.	Height.	Breadth of pelvis.	Obliquity of pelvis.	Remarks.
				Inches.	*Inches.*	*Degrees.*	
1	31	S.	Actress	62.5	12.5	47	
2	36	S.	.....	62	10.75	35	
3	25	S.	Nurse	64	11.75	38	
4	26	S.	Stenographer .	69.5	11.75	45	
5	39	M.	House	63.75	11.75	42	
6	36	S.	.....	64.5	11.25	40	
7	26	S.	Nurse	66	11.75	42	
8	25	S.	Physician.....	62	11.75	39	
9	24	M.	.....	65.5	12	42	
10	24	S.	.....	63	11.75	40	
11	24	S.	.....	64	12.25	37	
12	70	M.	House	61.25	11.25	37	
13	28	M.	Editor	60	11.75	38	
14	20	S.	.....	68	12.5	33	Slight tendency to anteversion. Intrapelvic pressure from throwing trunk too far back.
15	65	S.	.....	65	11.75	37	
16	22	M.	House	63	11	48	
17	22	S.	.....	67	12.25	40	
18	17	S.	.....	65.5	11.75	40	Intrapelvic pressure from carrying shoulders too far back.

Measurements of pelvic obliquity in healthy girls below age of 16 years.

No.	Age.	Height.	Breadth of pelvis.	Size of calf.	Obliquity of pelvis.
		Inches.	*Inches.*	*Inches.*	*Degrees.*
1	15	57.5	.....	.....	27
2	15	62	10.75	11.75	35
3	15	59	11.75	13.5	43
4	16	63.75	.....	12	37
5	15	60	11.75	13	37
6	14	61	11.75	11.5	29
7	11	55	9.5	10	33
8	11	57	10.5	.....	32
9	10	54.75	9.5	10.5	35
10	11	60	9.75	11	29

DISCUSSION.

Dr. A. Lapthorn Smith, of Montreal, Canada, said:

MR. PRESIDENT: If you will kindly take my paper as read I think the remaining time can be advantageously spent in a discussion of Dr. Mosher's paper, as I think it a very valuable one. We are devoting too much attention to the treatment of cases after diseases are contracted, but the old axiom is now as true as ever that "an ounce of prevention is worth a pound of cure." One of the most troublesome things we have to deal with is retroversion of the uterus and Dr. Mosher has treated the matter very carefully in regard to single women while I treat it in married women. It makes women very uncomfortable and I believe it is a frequent cause of fibroids. We can not draw too much attention to falling of the uterus forward during muscular efforts. Anteversion is the natural position of the organ and I do not believe there is any such thing as pathologic anteversion. It was the intention of the Almighty that every time a woman lifts a weight the round ligaments should contract and the uterus fall forward. I think we are very much indebted to Dr. Mosher for this valuable paper.

I shall take the liberty to express the thanks of the section to the gentlemen who have so ably filled the chair, and to the secretary who has discharged his duties so satisfactorily. The meeting has been a most interesting and instructive one, and I hope we shall all meet again before long.

Dr. Mosher said, in closing the debate: I have nothing to add, except that I believe we overestimate the value of the round ligaments. From their structure and their insertion it is evident that they are only calculated to serve as "stay lines" to be used in emergencies. Their work needs to be minimized and supplemented by the force of gravitation and this force can only be utilized by placing the pelvis at its normal angle of anterior obliquity.

At 12:50 o'clock the section adjourned *sine die*.

ON THE VALUE OF CERTIAN METHODS OF SURGICAL TREATMENT FOR CHRONIC PROCIDENTIA UTERI.

By AUGUSTUS P. CLARKE, A. M., M. D., of Cambridge, Mass.

In the Hippocratic Treatises under the title Περὶ γυναικείων, De Morbis Mulierum, mention is made of uterine disease; procidentia uteri is recognized and is described with a striking degree of accuracy. Whether all the treatises referred to were composed by the father of medicine, or are the works of some other writer, they nevertheless bear evidence of having been written at a time prior to that of Aristotle. The treatment which for a long time was employed for prolapsus uteri consisted in the use of vaginal injections of astringent substances and in the maintenance of the horizontal posture. When this method failed, pessaries of various devices were fre-

quently employed. They were medicated, solid, or of other character; they were resorted to as palliatives for overcoming the relaxation of the utero-vaginal structures. Episiorrhaphy was one of the earliest surgical measures undertaken for cases of procidentia uteri. The operation consisted in freshening the opposing surfaces of the labia pudendi and in uniting them by means of sutures. Thus, by lessening the lumen of the rima vulvæ, it was believed that the uterus could be maintained in a nearly normal position, or could at least be arrested while in a minor degree of procidentia. This measure of procedure has been far from satisfactory.

In a case of procidentia uteri that came under my care some years ago there had occurred strong adhesions which prevented replacement of the uterus. There was some enlargement of the organ, but this was evidently due to irritation consequent on the descent and the congestion and the relaxation of the utero-vaginal tissues. In this case I deemed essential an operation for closing in great measure the pudendi; the patient had nearly reached the menopause, and had become free from the duties of exercising the marital relation. The parts readily united and for awhile the patient regarded herself as much improved. At the expiration of two years she returned for treatment. I found that she was beginning to suffer again from pain and irritation; that the united tissues were undergoing ulceration and had yielded from the superincumbent weight of the uterus. The patient was much exhausted and required rest; before, however, her general condition could be improved sufficiently to justify a resort to further operative measures she was seized with a fatal malady. In two other severe cases in which I resorted to this method I found that after the lapse of time the parts yielded and the prolapse returned. Sims's original operation for overcoming prolapse was performed by scarifying the anterior wall near the neck of the bladder; he denuded the surface so as to have two diverging lines. This method was found to afford relief, but it was far from yielding good results; it had to be improved before it could be regarded as a safe procedure. The cervix at length caught into a pouch thus formed; this subsequently caused much inconvenience to the patient. Emmet recognizing the difficulties to be encountered in accomplishing this, believed that the operation would never come into general use.

Emmet in perfecting his operation anteverted the uterus and by means of a sponge probang he crowded the cervix into the posterior cul de sac. He then found some point on either side of the anterior lip where the folds could be brought together without producing undue tension. These were denuded and the operation was completed. By this means, Emmet claimed that he gained from the pelvic fascia a direct lateral support; this support he thought was independent of the column afterward formed from the tissues turned in along the anterior wall. In that class of cases, in which there was only a partial prolapse, his operation was the same in principle, the folds of the tissue on the anterior wall were to some extent turned in until the parts were reached where the vaginal canal had not undergone undue dilatation. If the posterior vaginal wall be involved or a rectocele be present an operation on this tissue must be undertaken. A perineal laceration must also be attended to. A review of the methods here referred to for relieving prolapsus uteri shows that the object is sought to be gained by diminishing what is commonly called a redundancy of tissue and by bringing about a more direct lateral support from the approximation of the vaginal walls and adjacent pelvic fascia.

However ingeniously this method of procedure may be carried out the principles embodying this means of giving support is far different from the one nature originally instituted. The six ligaments, including the retia uteri, are duplicatures of the peritoneum and are, when unrelaxed, the essential supports of the uterus. The round ligaments are membranous productions of the peritoneum. They commence at the upper angle of the uterus and pass finally to the labia majora. Muscular fibres from the uterus, as well as vessels, nerves, and connective tissue, are found to enter into their structure. Their function is evidently important in lending support and motion to the uterus. Relaxation of the uterine ligaments is not an uncommon cause of

procidentia. The presence of muscular fibers in the round ligaments offers an explanation of the proneness of those ligaments to undergo relaxation. Congestion, inflammation, and other disturbing processes occurring in the uterine tissue may lead to fatty degeneration, atrophy, and to other changes in those structures and may cause them to yield before the superincumbent weight. I have notes of four cases in which relaxation was brought on by this cause. In each of these cases there was no perineal and no cervical laceration.

An unusually large and wide pelvis is not an infrequent cause of prolapsus. Such cases are much less amenable to treatment than are those cases in which prolapsus is due to relaxation of the parts connected with the utero-vaginal region. Ventral fixation of the uterus is an operative measure which has of late been undertaken for intractable prolapse. There are several ways in which this has been done. After abdominal section, the broad ligaments, and also the round ligaments at their base may be stitched to the abdominal wall. By this means the uterus may become fixed to the anterior wall, and, for awhile, partial relief may be afforded. The ventro-fixation, however, is an unnatural one and is liable to cause at times pain and much inconvenience, similar to what is often experienced whenever the uterus has become fixed in position by adhesive inflammation, or by other morbid process. A case of this kind not long since occurred in my practice. It was the result of an operation necessitating a partial removal of the right broad ligament in a case in which an abdominal section was resorted to for excision of a morbid growth. Ventro-fixation was tried in order to retain the uterus in situ. The operation was easily accomplished, but the patient subsequently complained at times of annoyance and inconvenience from the dragging sensation on the abdominal wall.

In a case in which ventro-fixation is effected after the removal of the tube and ovary on one side by stitching the stump to the anterior abdominal wall the fundal section of the uterus will subsequently be found unduly rotated toward that side and the uterus itself will prove to be in a fixed state of anteversion. In a case in which the tube and ovary on each side are removed ventro-fixation offers but little more advantage than its adoption in instances like those occurring in a case in which the adnexa on one side only has been removed; for if the stump of each pedicle is sutured to the wound or to the anterior abdominal wall the uterus will become more or less anteverted from the fixation in its new positon. Rotation of the organ to one side will most likely result from the unequal contraction at the point of the fixation of the tissues brought into such union after they have become firmly cicatrized. The adoption of this mode of procedure offers no advantage over that of hysterectomy. A uterus, shorn of its adnexa can be of no possible material service to its possessor; under such circumstances it would hardly seem worth while to endeavor to effect relief by stitching its fundus to the abdominal wall. In such a position it is liable to be source of trouble if not of much actual suffering.

The operator may flatter himself that he has resorted to a most brilliant measure for relief, and the poor patient may fancy that she has had a remarkable escape from impending ills and be loud in sounding the praises of her gynecologist. If, however, it shall be her fortune to survive, time will not fail to undeceive her, especially after she attempts to resume her domestic duties; before she can escape the local suffering that is most likely to follow, other important surgical measures will have to be called into requisition for insuring permanent relief. The operation for shortening the round ligaments in cases of prolapsus uteri has no doubt in many cases been productive of much good. The striated muscular fiber entering into the structure of the round ligaments invests them with the power of contractility. The presence of these ligaments in the human female tend to prevent posterior displacement of the uterus whenever undue contraction of the abdominal muscles from any cause takes place. These ligaments no doubt become moderators to any excessive muscular action that may interfere with the normal equipoise of the uterine tissue. In case of chronic prolapse the ligaments will often be observed to have undergone

much change; they will be found to have lost their contractile power and will, of course, fail to respond to any stimulus that may be impartial to their tissues.

In those cases in which they may respond to the presence of stimulus, they will, in great measure, prove powerless in preventing the occurrence of prolapse, for their function is rather to preserve the uterus from a backward displacement than to overcome the factors that enter into the causation of its descent. Undoubtedly these ligaments as they now appear in the human organism are as yet the beginning, or rather the rudiments, of structures which, under favoring circumstances, during the course of coming ages could arrive to a high state of development. That their progress toward this consummation has been much retarded by the faulty habits of their possessors there can, in the minds of all thoughtful gynecologists, be but little doubt. Dr. J. H. Kellogg * quotes Dr. Bland Sutton, an English writer, who has made special study of the pelvic diseases appearing in the females of the lower animals, as stating that the round ligaments are present in none of the lower animals, with the exception of the chimpanzee and the higher apes. An attempt at ventral fixation, with the view of suturing the round ligaments through a central incision of the abdominal wall, may prove ineffectual, especially in women of relaxed muscular habit, or in women in whom there is an excessive accumulation of fatty tissue in the abdominal parietes.

I have spoken thus much on matters relating to certain methods for overcoming prolapsus uteri and I have referred to their final results. I have discussed to some extent the surgical measures undertaken for the restoration of the perineum. Colpo-perineorrhaphy has been considered and mention has been made of those cases in which it has been attempted on the anterior and also on the posterior vaginal wall. An early resort to the operation for narrowing the vaginal wall has with some operators been attended with favorable results. Much success has been obtained in those cases in which high posterior colporrhaphy and high perineorrhaphy have been undertaken. Though much relief follows in some cases and most favorable results in others yet there is a class of cases which rarely improve under such measures of procedure. Another plan of treatment therefore is often imperatively demanded. I have spoken of the unimportance of the uterus after it has been shorn of its adnexa. In that class of cases in which only one ovary has been removed and the menopause has not been reached, other things being equal, the uterus may still carry on its normal functional activity; the marital relation will not essentially be disturbed. In those cases in which both ovaries and tubes have become seriously affected and in which there has been an intractable prolapse, resort to hysterectomy appears to offer the best chances for permanent success.

Some years since Mr. Keith considered that hysterectomy could reasonably be recommended in many cases other than of a cancerous nature. Later experiences have shown that vaginal hysterectomy is often imperatively demanded for malignant disease and that it should be resorted to at an early date. The chief danger to be encountered in the operation is that arising from hæmorrhage. By the strict observance, however, of antiseptic precautions and by the careful suturing of the tissues before excising them, the danger will be reduced to a minimum. F. A. Purcell, of Manchester, England,† informs us that in 1828 Dr. James Blundell was the first in England to perform successfully, by vaginal section, total extirpation of the diseased uterus. This subject has in England given rise to much discussion. The German surgeons ‡ were the earliest to revive the practice. By careful study, wise discrimination, and by their increasing experience they have achieved excellent results. The records as furnished by the distinguished German operators, including Schroeder, Olshausen, Martin, Haidler, Czerny, and Sänger show that vaginal

* Transactions of the American Association of Obstetricians and Gynecologists, Vol. II, 1889.

† "Vaginal hysterectomy for malignant disease." Transactions of the Ninth International Medical Congress, 1887.

‡ *Op. cit.*

hysterectomy, resorted to even for malignant disease, was followed with a mortality of only from 28 to 30 per cent. Other operators also have obtained similar success. Results in favor of vaginal hysterectomy have been far in advance of those by the abdominal method.

In an able paper on vaginal hysterectomy, with observations on eleven cases of malignant disease, contributed by Dr. Charles A. L. Reed,* the results shown are still more gratifying. Out of this series of cases of vaginal hysterectomy there occurred only one death. From the discussion which followed the reading of this timely communication, it would seem that by the recent advances which have of late been made in surgical attainments, vaginal hysterectomy when resorted to at an early date, if properly performed, is an operation comparatively free from danger. Goodell,† in speaking of vaginal hysterectomy, says that the general consent of gynecologists has fixed upon the vagina as the best channel through which the uterus should be extirpated, whether for cancer for incurable prolapse or for fibroid tumor, provided that the organ at the time is not unduly enlarged. It may further be remarked that in case of prolapsus uteri, without the complication of cancer or of fibroid or other tumor, it would be exceedingly rare to find a uterus so enlarged that it could not after excision be removed through the vagina.

In a paper on the "Treatment of complete prolapse of the uterus," contributed by Dr. J. C. Irish, there is a report of two cases in which anterior and posterior colporrhaphy had previously been made according to Hegar's method. In each case, the prolapse having returned, vaginal hysterectomy was performed, yielding most satisfactory results. In the first case the patient's age was 40 years. She had had two children. Besides making an anterior and posterior colporrhaphy, the elongated cervix was also amputated. In less than a year after the operation vaginal extirpation was accomplished in the same manner as when resorted to for a carcinomatous uterus. In the second case the patient's age was 48 years. A recurrence of the procidentia following Hegar's operation, vaginal hysterectomy had to be called into requisition. The difficult part of the operation in each case was in overcoming the close attachments, which in these instances had been very firm and extensive, between the uterus and the bladder. The patients rapidly recovered. There was no apparent pressure of the abdominal contents into the vagina. Dr. Irish makes mention of a case of prolapse, reported by Dr. Krug, in which hysterectomy was done. The operation afforded permanent relief.

At a recent meeting ‡ of the Gynecological Society of Boston I had occasion to state that I had had in my practice some cases of intractable prolapsus uteri, in which I was compelled to resort to vaginal hysterectomy. In each case the results of the operation were successful. My own experience in these and in other cases leads me to say that the operation is not a difficult one; that it does not expose the patient to so many dangers as are incident for the most part to other methods of procedure, especially to those of abdominal section. A resort to hysterectomy effects a permanent cure. The first case was that of Mrs. E., aged 48 years. She was a multipara, and had suffered from the displacement for several years. There had been a partial laceration of the perineum, but perineorrhaphy had been resorted to. Anterior and also posterior colporrhaphy had been performed. For some months afterwards the patient experienced much relief. After the lapse of sixteen months the prolapse returned; the vaginal tissue was much relaxed and the other structures in the immediate vicinity were unusually distensible. The patient was stout. She had an abnormally large and broad pelvis. There was but little posterior displacement. The case was evidently one of complete descent of the uterine tissue. The indications were that any attempt at shortening the round ligaments would fail to afford permanent relief.

* Transactions of the American Association of Obstetricians and Gynecologists, Vol. III, 1890.
† Medical News, 1891.
‡ December 8, 1892.

The patient in the second case was aged 44 years. She had a broad pelvis. She was also quite stout and of relaxed habit. She had given birth to six children. All her labors had been rapid. The perineum during the third labor was ruptured, but an operation for its restoration was attended with good results. An operation for shortening the round ligaments had been attempted. Other surgical measures had also been proposed, but were declined, because the patient could not reasonably be assured that permanent relief would follow. In another case in which anterior and posterior colporrhaphy was tried the patient for some two years experienced marked relief. After sustaining, however, a severe strain the former symptoms began to return and not long afterwards the prolapse was as marked as before. Vaginal hysterectomy was proposed and was accepted. The operation was effected with but little loss of blood; no untoward symptoms followed. The record of these cases illustrates, to some extent, the advantages of vaginal hysterectomy over the other methods of surgical treatment which have been more commonly adopted for intractable prolapse.

NOTES POUR L'HISTOIRE DES FIBROMIOMES UTÉRINS,

Par le Dr. NICOLAS SAN JUAN,

Professeur de Gynécologie de la Faculté de Médecine de Mexico (Mexique), Membre de l'Académie de Médecine de Mexico (Mexique), etc.

J'ai l'honneur de vous présenter l'extrait de quelques-unes de mes notes sur l'intéressante étude des fibromiomes utérins.

Je me permettrai seulement de vous communiquer les points qui, à mon avis, présentent un nouvel intérêt.

D'après moi, ils se réduisent à deux principaux: Le premier est relatif à l'étiologie et le second au diagnostic, en relation avec le parenchyme utérin. Voici le tableau statistique:

Parmi les 984 malades que j'ai inscrites pour la première fois, pendant l'espace de 3 ans, il y en avait 39 qui souffraient de fibromiomes utérins.

De ces 39 cas étaient multiples sub-péritoniales, 12; sub-péritoniales intra et extra-murales, 15; intra-murales seulement au corps, 3; intra-murales comprenant le corps et le col, 2; unique et grand péri-utérin pédiculé compliqué de syphilis, 1; fibro-quiste péri-utérin, 2; intra-utérin à large base d'implantation, 4.

Parmi les malades de la première série, il s'en est trouvé 3 qui avaient des palpitations et souffle aortique; 1, oppression précordiale et fort choc, et l'autre atrophie du cœur, ce que l'autopsie a prouvé plus tard.

Dans la deuxième série, 3 présentaient choc précordial intense et bourdonnement auriculo-métallique; 1, insuffisance mitrale; 1, sonorité excessive au premier bruit, choc intense; 1, fatigue en marchant et tension artérielle basse; 2, ont eu des cas de décès dans leurs familles provoqués par des maladies de cœur.

Dans la troisième série, une des malades avait des frémissements cataires et congestion pulmonaire.

Enfin, dans la quatrième série, 2 avaient le souffle anémique.

Parmi les 1560 malades inscrites pour la première fois dans la clinique de mon infirmerie particulière, et appartenant en majeure partie à la classe pauvre et travailleuse, j'en ai rencontré seulement 24 qui souffraient de fibromiomes. Il y en avait 8 sub-séreuses, 12 intramurales, 2 intra-utérins, et 2 sessiles dans la partie vaginale du col.

Parmi les malades de la première série, 3 avaient de fortes impulsions du cœur et des palpitations; 1 avait le souffle aortique persistant pendant le premier temps.

Dans la deuxième série, 1 avait un souffle de scie dans le premier temps dans le siège aortique et des vertiges; 2 avaient le souffle faible sans prolongation sternale; 2 présentaient des bourdonnements auriculo-métalliques, et 2 enfin, qui étaient des personnes de plus de 40 ans, avaient goutte dans les mains.

En résumé, sur les 39 malades de fibromiomes de la première classe, il y en avait 12 qui présentaient diverses formes de cardiopathies.

Dans celles de la deuxième classe, 9 se trouvaient dans les mêmes conditions.

Comme on le voit par cette statistique, il est remarquable la différence qui existe entre les malades affectées de fibromiomes appartenant à la classe aisée ou à la classe travailleuse, circonstance qui est également connue de toutes les écoles.

On voit également dans mes notes que la coïncidence entre les fibromiomes utérins et les lésions organiques du cœur est très fréquente, dominant entre celles-ci la sténose relative de l'orifice aortique. Il faut également remarquer que celles-ci et autres cardiopathies surviennent de préférence avec les fibromiomes intra-muraux et sub-péritoniaux. Ces derniers cas se présentent rarement accompagnant les petits fibromiomes pédiculaires de la cavité utérine.

En conséquence de ce que je viens de dire précédemment, et de l'étude que j'ai faite jusqu'à présent sur les malades dont je viens de parler, je vais m'aventurer à donner mon opinion en ces termes: La production des fibromiomes utérins est un fait subordonné à la manifestation de l'arthritis, comprenant dans celle-ci, comme Martineau et Pidoux, le rhumatisme et la goutte.

C'est ce qui concerne les fibromiomes utérins de notre pays au moins, au point de vue de leur étiologie générale.

Quant aux causes déterminantes de ces néoplasmes, j'ai trouvé dans ma pratique que c'étaient les flexions du corps sur le col et les sténoses externes. Je pourrai pourtant assurer que ces flexions sont toujours préexistentes à ces néoplasmes.

Le second point sur lequel je veux appeler votre attention est celui qui est relatif au diagnostic de ces tumeurs.

Tous les gynécologues expérimentés ont fait usage de la sonde utérine dans ces cas et s'en sont même servis pour déterminer l'épaisseur des parois utérines, afin de savoir de quel côté était le néoplasme; mais personne, que je sache, n'a tiré un plus grand profit qu'on peut obtenir de l'histérométrie en relation avec le diagnostic précis du siège.

En mesurant exactement jusqu'au fond de la cavité utérine avec la sonde malléable, j'ai pu m'assurer que l'augmentation des cavités est en proportion avec l'épaisseur du tissu utérin qui contribue à former la capsule ou les capsules des fibromiomes. Cette particularité est très importante à connaître dans ces cas; on ne la connaissait jusqu'à présent que par l'inspection directe. La règle que je viens de donner souffre peu d'exceptions.

Je crois important de déclarer que pour la guérison radicale des néoplasmes en question par le moyen de la chirurgie, il est préférable pour l'avenir de la malade de faire l'hystérectomie abdominale comme je l'ai vu mettre en pratique, et comme le recommandent les professeurs Hogar, Kaltenbach et Charles Braun de Vienne, à moins qu'on n'ait la facilité d'extirper tous les noyaux qui peuvent se développer plus tard.

Mon expérience dans ces opérations m'autorise à appuyer cette dernière opinion.

THE COÖRDINATION OF THE MUSCLES CLOSING THE URETHRA, VAGINA, AND RECTUM, AND ITS APPLICATION TO THE PRECISE DIAGNOSIS AND SURGICAL TREATMENT OF INJURIES TO THE PELVIC FLOOR.

By A. W. ABBOTT, M. D., Minneapolis, Minn.

That the perineum completes the outer layer of pelvic supports, that it perfects the valvular closure of the vaginal opening, that it performs an important function in copulation and conception, are sufficient reasons for its restoration after rupture.

The condition of the muscles supporting the pelvic openings may be determined in a precise and positive manner by the application of the physiologic principle that when the sphincter ani is made to contract voluntarily the entire levator ani, as well

as the perineal muscles proper, contract at the same time, and can therefore at all times be influenced by the control of the sphincter ani.

To ascertain what muscle or muscles of the perineum are torn, place the patient in a dorsal position with the perineum exposed. If now the patient alternately contracts and relaxes the sphincter ani, all the other muscles involved contracting and relaxing, as before stated, at the same instant, it will be immediately apparent, by touching the normal positions of the various muscles, which ones contract throughout their full extent and are therefore intact, and, as positively, those that are torn, by the total or partial loss of contractile hardening at the point of rupture. Indeed, the exact site of injury may often be made out by sight alone, the sound side drawing up, while the tissues of the injured side are carried toward the uninjured side, instead of counteracting the effect of the latter as they normally should.

It will be immediately seen on trial that this affords a positive means of determining the exact condition of each individual muscle. Instead of the indefiniteness which has given rise to so many methods of operation, we have an exactness in demonstration on which can be founded an equally exact surgery.

To explain more in detail: With the patient in the dorsal position, ask her to contract and then relax the sphincter ani. I have never known but one patient to fail in doing this understandingly with a very little explanation. Place a finger upon each side of the median line and just within the tuberosities of the ischia. If the left side contracts and the right does not, we know at once that the right transversus perinei is torn. With the thumb in front and the forefinger in the vagina and to the side, we in like manner determine the condition of the sphincter vaginæ. Passing the finger just within the pubic arch and to the sides of the vagina, the firm, rounded form of the pubic part of the levator ani is particularly noticeable if the contraction be good and the muscle whole. The contraction of the obturator and coccygeal parts of the levator ani can be also distinctly made out.

In regard to ruptures involving the levator ani, there has much been written that is confusing and many operations performed with this lesion as a supposed basis, when, in fact, it did not really exist. Without unwarrantable artificial force the coccygeal part can not be torn during parturition, as it can be stretched only as much as the limited extension of the coccyx demands. The obturator part passes entirely past the vagina and is attached to the very posterior line of the rectum, being loosely connected to the lateral vaginal borders. This part of the muscle is not subjected to enormous strain during the passage of the child. If a rupture occurs through the vagina opposite this part of the levator ani, it can not tear the muscle, as there are no fibers which pass between the rectum and the vagina, and the bones prevent excessive distention. The most that can occur is a pushing off of the muscle from the vaginal and upper rectal border.

The pubic portion is the most interesting to the obstetrician and surgeon, as this is the part which bears the greatest strain; yet we believe, notwithstanding all that has been written, that it is seldom the seat of extensive rupture, but that if torn none of the usual operations will reach the part likely to be injured.

Having looked anxiously for this lesion in all possible cases for over two years, I have only found five in which very extensive rupture could be demonstrated. If the fibers of this part of the levator ani passed between the vagina and rectum, as usually represented, this muscle would frequently be torn. In several dissections and in over a hundred examinations in virgins and nulliparæ I have not been able to discover the fibers of this muscle extending between the vagina and rectum, nor have I in a single instance found the slightest contractile hardening which could be traced to this muscle while the perineum was grasped by the thumb in the vagina and the forefinger in the rectum, and yet the firm fibers of the contracted muscle can always in such subjects be followed from the pubic arch to the lower side of the rectum. In the five instances in which I have observed very extensive rupture

of this muscle, the rectum and sphincter ani, instead of being drawn normally toward the pubic arch, were drawn a little upward and to the sound side. The patients had not the slightest power of contracting the outer third of the vagina.

The ordinary conditions are as follows: If the tear is median the levator ani is not usually injured. If (as occurs in 80 per cent. of severe lacerations) the tear is upon one side—the right almost invariably—the mucosa of the sulcus, the perineal fascia, and a few of the anterior fibers of the levator are torn through with the transversus perinei; but the most important feature of the injury lies in the pushing off of the vagina from its rather loose attachment to the levator, so that the tissues upon the median side of the tear occupy a lower plane than usual; but upon the injured side only. Scars in the mucosa are not to be relied upon as indicating the exact site of deeper injuries. Rupture of the muscle and fascia may take place without rupture of the mucosa, or, if a scar in the mucosa is present, it is quite likely to be at a distance or lie in another direction from the deeper tear.

Having definitely located the injury, the technique of operation is simple. Incise the mucosa and dissect down to the torn ends of the muscle. Place stitches so as to draw the ends of the muscle together. If the rupture involves only the tranversus perinei a small transverse incision will suffice. If the pubic part of the levator ani is ruptured the operation is more serious, as the incision should be in the sulcus and the dissection carried down to the plane of the levator, in some cases as far as the posterior plane of the rectum, and the muscles exposed and drawn up with catch forceps; tendon or well-chromicized catgut should then be passed so as to get a deep and secure hold upon the muscles. It is usually necessary to dissect up the outside mucosa and fascia, so as to get as good a point as possible for the new insertion of the muscle. Should it be necessary, the operation may be completed by Emmet's operation.

It will be seen from the above that in some cases Tait's flap splitting operation will produce good results, if the dissection is carried into the muscular plane and the sutures properly placed. It also explains the rationale of the success attending the operation described by H. O. Marcy, who has also given us such perfect illustrations of the perineal structure. It also proves the absolute correctness of the Emmet operation, as far as it goes.

While the technique of the operation may undoubtedly be improved upon, we believe that an appreciation of coördination of the pelvic muscles must be the foundation of a correct surgery of the part.

The results, after nearly three years of operating by this method, have been certainly gratifying, the perineum not only being restored to its nulliparous form, but, what is of more importance, the control has been perfect.

PERINEO-VAGINAL RESTORATION.

By EDWARD W. JENKS, M.D., LL.D., Detroit, Mich.,

Professor of Gynecology, Michigan College of Medicine and Surgery; Fellow of the American Gynecological Society; Fellow of the Obstetrical Society of London, etc.

I purpose presenting under the above title a paper in which are briefly considered some of the frequent injuries to the perineum and lower portions of the vagina in childbirth, and a surgical procedure for restoring them to an approximately normal condition.

In 1877 I read a paper before the Michigan State Medical Society in which were mentioned "some new procedures in the operation for laceration of the perineum," and on January 8, 1879, I read a paper before the Cincinnati Obstetrical Society, which was published in the American Journal of Obstetrics for April, 1879, describing the same procedure as in the first-mentioned article, the latter being entitled "Perineorrhaphy and a description of a new mode of operating." This paper advo-

Fig. 1.

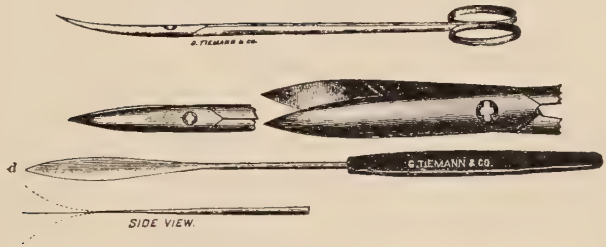

Fig. 2.

Fig. 3.

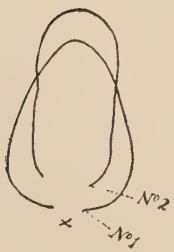

Fig. 4.

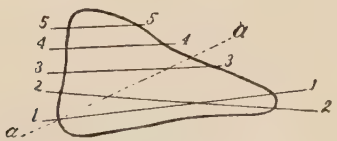

Fig. 5.

cated a new mode of submucous dissection of the tissues, or what is now designated flap-splitting. This method of operating was favorably commented upon by the leading medical journals of the day, and the leading text-books on gynecology published in this country continued for many years to sanction it. In that paper the cutting away of the flap instead of preserving it was advised. Subsequently I preserved the flap, and, believing for a time that my mode of operating, as well as the preservation of the flap, was original, so stated when asked regarding it by some of my friends. But, learning that others had also described saving the flap, no claim has been made as to its originality with myself. The submucous dissection I described—or flap splitting operation, as now designated—was made several hundreds of times by me in public clinics, as well as by many others who had adopted it, some years before the flap splitting operation of Tait or others had become known. However, I am not strenuous in claiming priority in the mode of operating I described so long ago, as it is of little importance, for I am only one of the great multitude working in the field of gynecologic surgery.

I am prompted to this historical fact as an introduction to this paper, as the surgical procedures which I set forth sixteen years ago are occasionally referred to at the present time; and a late edition of a well-known text-book, that had previously commended it by means of lengthy quotations and illustrations, now dismisses it by a brief allusion as "too bloody."

Although repeatedly asked to write an additional paper, I have had other fields to cultivate and what seemed more important in surgical matters to engross my time and attention; but of late there seems to have been a revival of interest in plastic gynecologic surgery.

Description.—The operation I make to-day, and which is described in this brief paper, is, I believe, a great improvement on my former method. It would hardly be possible for one to make hundreds of operations of any kind without finding a chance for some improvement either in the mechanical portion or in results obtained. There have been many surgical devices brought to the notice of the medical public under the general title of perineorrhaphy, but the merits or demerits of other operations than the one here described will not be considered.

It is not my purpose to discuss laceration of the perineum or the necessity for repair in detail. It is well known to every careful observer that rather extensive laceration of the perineum and vaginal walls occurs in childbirth from which no bad results follow. Again, it is equally well known that many discomforts and divers reflex symptoms often ensue from lacerations that at the time of their occurrence seem too insignificant to demand a passing thought or even a single suture.

The immediate or primary operation will not be discussed. It is to the consideration of secondary operations alone that your attention is called. I will state, as a general proposition, that operations are not demanded because of laceration *per se*, but when there are unmistakable discomforts that can be plainly traced to them, and health and comfort can only be recovered by restoring the torn parts to their normal relations.

The portion of the recto-vaginal septum, commonly designated the perineum, supports the lower portion of the posterior vaginal wall, which in turn supports a corresponding part of the anterior vaginal wall. The lower portion of the rectum is sustained, and the proper performance of its functions aided, by the perineum as a whole, but particularly by the levator ani. Four muscles, the bulbo-cavernosus, the transversus perinei, the anterior portion of the levator ani, and the sphincter ani, are united in the perineum, and it is the severance of these from their fellows on the opposite side, together with the separation of the perineal fascia, which produces the mischief; therefore laceration of the perineum and a portion of the posterior vaginal wall, whether partial or complete, may cause a variety of conditions, such as loss of vulvar integrity and impairment of the functions of the rectum; partial or complete incontinence of the rectum and bladder; increased and irritating secretions

of the vagina and rectum, and recurring prolapse of the rectum after operation for prolapsus recti; descent of the recto-vaginal septum, or rectocele; a similar condition of the anterior vaginal wall and bladder, or cystocele.

It is now a long time since attention was called to the prominence which the levator ani muscle occupies among the others of the pelvic outlet. Nevertheless the functions and importance of this muscle have not been sufficiently considered by the majority of either writers or operators. Therefore they have not always appreciated how large a part it plays in producing the above pathologic conditions.

Dr. Robert L. Dickinson,* in his article "Studies of the levator ani," has given a very full and admirable description of the relations, functions, and strength of this muscle, with illustrations and diagrams.

I have seen quite a number of patients that had been operated upon, with the result of having, to all external appearances, a perfect perineum, but with a rectocele above the line of the dissection or flap-splitting, that formed an excellent pocket for the accumulation of uterine and vaginal secretions in which the neck of the prolapsed uterus was constantly macerating. In many of the cases where only a portion of the redundancy is remedied the only benefit seems to be to provide a better support for some form of pessary to sustain the uterus and vaginal walls.

My own observation and experience, which I presume agrees with others, is that there are, at least in a general sense, four important ends to be attained in repairing the class of injuries under consideration: (1) To restore the loss of power and function to the lower portion of the rectum and vagina; (2) to restore the normal sustaining quality of the posterior vaginal wall for the anterior vaginal wall and bladder; (3) to provide as much support for the uterus as the perineum naturally gives; (4) to cure the many distressing nervous accompaniments.

Any surgical procedure which does not obtain relief to a great degree is not, in a strict sense, successful. A perineum may be operated upon and, as far as external appearances are concerned, be a success; but if above the point of dissection there still remains a redundancy of the vaginal walls, or the restoration is not sufficient to support the anterior vaginal wall, the operation is but partially efficient. This is true whether the uterus is held up to the health line or not. There are so many causes operating to produce uterine displacement that it is not, as a general rule, just to gauge the success of an operation by the measure of uterine support it secures. For the reason that these partial operations are often insufficient, and are not followed by the anticipated beneficial results, I have chosen to designate the surgical procedure I have been making for a number of years perineo-vaginal restoration. To accomplish the best permanent results it is essential that dissection of the flap extend as high within the recto-vaginal septum as there are signs of slack or redundancy of the posterior wall. My mode of procedure is as follows: I first nick with the scissors each labium to mark either termination of the anterior margin of the flap, and then, having introduced two fingers into the rectum, and assistants making the parts taut, I insert the sharp-pointed scissors near the juncture of the integument and mucous membrane in the median line, or sometimes on one of the nicked lips, and proceed to dissect a flap up the septum as far as redundancy of the walls can be observed (fig. 1). It is important, for the sake of making a more rapid and neat operation, that the dissection be made in its entirety without withdrawing the scissors. When I first described my mode of operating in 1877 my friend, the late Dr. Albert H. Smith, devised a knife to take the place of scissors, and subsequently I caused a knife to be made larger and more flexible than his (fig. 2, *d*). The scissors which I have used for the past six years are slightly curved, with blades completely overlapping each other, and both inner and outer edges ground equally sharp. I have found this form of blade is less liable to become entangled in submucous dissections than the ordinary-shaped blade (*see* fig. 2). These scissors can be used alternately in their proper capacity or with blades closed as a knife to dissect the flap

* Prize essay, American Journal of Obstetrics, September, 1889.

more perfectly, as their sharpened outer edges and points render this an easy task; and there is a great advantage in their use in cases where there is tendency to bleed, as there is less hæmorrhage than with an ordinary knife. One objection recently made to this operation is that it is bloody, and sometimes one or more arteries have to be tied. In the event of arteries being severed, compression with hot sponge or twisting will usually suffice; but if ligation is required, catgut is preferable if the ligatures are buried. In many hundreds of operations I have not been compelled to ligate vessels, all told, more than six times. The next important step in the operation, after the dissection of the flap, is the insertion and adjustment of the sutures. No better results have ever been obtained than by silver sutures, but on account of their stiffness they cause more pain; therefore I substitute the silkworm gut, which possesses the principal advantages of silver wire and is not so unyielding. Kangaroo tendon is also a safe and useful suture. The needles are a straight, flat, noncutting needle, about 2 inches in length, and a slightly-curved Peaslee needle. The latter is provided with a carrying thread of No. 4 or 5 braided silk 18 inches long. The former is used only for the short and superficial sutures, which are threaded directly into the needle. In the majority of methods of operating for incomplete laceration, the first and frequently the second sutures are shorter and of far less importance than the third or fourth and fifth, as the case may be. But in my operation matters are reversed, for the first two sutures are the longest and most important. Indeed, for want of a better term I often call them the "parent stitches" (fig. 4). The first assistant lifts up the flap by means of a tenaculum hooked into the edge at the center (fig. 3). Introducing two fingers of the left hand into the rectum to guard against wounding it, I start the needle at the distance of one-third to one-half of an inch back from the denuded surface, and turning the point well toward the left buttock, and the handle correspondingly as far in the direction of the right buttock, I push it rather deeply into the tissue of the anterior ischio-rectal space, then upward and finally inward along the recto-vaginal wall until it has been carried just above the highest point of dissection in the center, at which location, or as near to it as possible, the needle point is brought out. The needle is then introduced in the same manner in the opposite side, the upper end of the suture threaded into the loop, and the other half of the stitch carried to place. For the second stitch the needle is started in about a third of an inch above the first, and its point directed at first outward in the same manner as in the introduction of the first suture. Not quite so much lateral tissue is taken up this time; that is, the needle does not make quite so wide a side sweep for the second suture, but passes more directly up along the recto-vaginal septum, and, when it has reached the upper third of its course, crosses the first suture and comes out on the vaginal mucous membrane about one-half or two-thirds of an inch above the central highest point of dissection. After drawing the first half of the suture into place the needle is introduced in the same manner on the opposite side for the second half of this stitch. For the third stitch, a third of an inch above the second, the needle passes along the denuded surface till it reaches the line of junction of the septum and the flap, when it enters the latter at about its upper fourth, burrows across to the opposite side and down the denuded surface to the outside. This stitch can sometimes be introduced in one continuous circuit, in other cases one-half at a time. The fourth and fifth stitches are buried under the denuded surface as far up as the junction of the septum and flap, where they pass under the flap, without burrowing in it, to the opposite side. With each of these sutures it is usually more convenient, although not necessary, to put in one-half and then introduce the needle on the opposite side in the same manner for the other half.

When the sutures are drawn up en masse the flap will emerge more or less from the introitus and will frequently have the appearance of being much too long; the operator will consequently be tempted to pare off a quarter of an inch or more from the anterior edge, but this should not be done except in rare cases of great redun-

dancy. This slack is disposed of by the gradual retraction of the flap during the process of healing and settling into normal relations. The sutures are now loosened again and the sixth stitch introduced, which is designed to purse up the anterior side of the flap and also bring together the last of the denuded surface. For this purpose the straight, thin needle previously mentioned is used. The needle is passed under the portion of denuded surface contiguous to the edge of the flap, and thence into and through the latter to the opposite side.

Care is required, in adjusting the first two long sutures, not to draw them too tightly, otherwise they will cut in a little, and, owing to their including so much tissue adjacent to the rectum, will be painful. The third, fourth, and fifth sutures can be drawn more tightly. The sixth, again, should be but moderately tight, as the pursed-up edge of the flap will not bear much restriction. Usually two or three superficial sutures of fine silk, horsehair, or small silkworm gut will be required to coäpt any raw edges turned out by the puckering-up of the flap. These last are not absolutely essential, but they give a neat appearance to the operation, as well as dispose of surfaces for absorption or granulation. If silver wire has been used, the ends may be massed together and inserted into half an inch of small rubber tubing to prevent them from pricking the patient.

In any surgical work, but especially in the plastic operations of gynecology, it is extremely convenient and helpful to an operator if he is ambidextrous. However, but few possess this accomplishment to a full degree, and it is not really a *sine qua non* to skillful operating. Many expert operators do not.

In case there seems to be a tendency to persistent hæmorrhage beneath the flap I place as a compression stitch a strong silk suture, by means of a Peaslee needle, outside of the adjusted sutures and over the flap, which I retain for about twenty-four hours and then remove (fig. 5, *a*).

In this operation, or almost any other for perineorrhaphy, the long stitch or stitches which pass from the outside up to the highest point of dissection in the vagina should always be put in one-half at a time. If the dissection is made even approximately as high as it should be, a slightly curved needle can not make the whole circuit at once, except in a patient with lax tissues and a broad space between the tubera ischiorum. But even when it can be done it is accomplished at the expense of considerable strain on the parts operated upon and on the whole vaginal column.

I have constantly mentioned six as the number of sutures employed, but only because that is the number most commonly required. Occasionally five are sufficient and sometimes seven or eight are needed. As there are no exposed raw surfaces, either externally or internally, but little dressing of any kind and but few vaginal douches, are demanded. Three or four are the usual number; one at the end of thirty-six hours, another on the fourth or fifth day, and another on the morning of the day the stitches are removed, usually the seventh. The external parts, on the other hand, require about the same attention as in other perineal operations. Night and morning, and each time after urinating, the soft parts adjacent to the line of union, and also the buttocks, are carefully separated and the wound and the surrounding parts gently irrigated with sterilized water or a 1:6000 solution of bichloride. The bowels should be thoroughly evacuated about the sixth day after the operation by a laxative, a saline, and an oil enema, and the sutures removed about the seventh day. To insure solidity of the newly constructed parts I require the patient to lie in bed from two to three weeks.

The surgical procedure which I have described in this paper can not commend itself on account of the consummate ease or rapidity with which it can be made. It is not as easily or quickly done as ordinary perineorrhaphy, nor even as the flap splitting operation of which so much has been written of late. But after essaying different operations from Baker Brown's to many of the present day, I have settled upon the method I have here briefly outlined as the best one I can make for the great majority of cases that present themselves to me for treatment.

In conclusion, there are a few points to which I wish to direct attention:

(1) Any single mode of operating is not adapted to every case of laceration of the perineum.

(2) All other qualifications being equal, that surgeon will be the most successful in this class of operations who, instead of following hard-and-fast rules, possesses a mechanical skill which he can adapt to the peculiarities of each individual case.

(3) The subsequent comfort of patients is not facilitated by superabundance of cicatricial tissue within the vagina; therefore the anterior wall, instead of being subjected to any surgical procedure for redundancy, should be sustained by a restoration of the normal posterior wall.

(4) The surgical operation here advocated has for its object a restoration of the torn posterior vaginal wall and perineum to their normal condition and functions, whereby there is afforded (*a*) support for the uterus to the full extent provided for in the vaginal walls; (*b*) support for the anterior vaginal wall and bladder; (*c*) support for the lower end of the rectum.

WHEN OPERATIONS ARE DECLINED—WHAT NEXT?

By GEORGE R DEANE, Spartanburg, S. C.

This question, propounded to many surgeons, could be easily answered by simply saying that if a patient, after a plain statement of facts, should decline operation, they would retire from the case and leave it in other hands. The object of this paper, however, is to ascertain the consensus of opinion of this congress as to the course to be pursued from a surgical and also from an ethical standpoint.

While in many cases it might be wise and proper to withdraw from one, when operation is declined by the patient or by friends, nevertheless the case remains, and its treatment must be left in the hands of an intelligent surgeon or be relegated to the charlatan or mountebank. The question then arises: What is the best treatment and what is the duty of a conscientious and intelligent surgeon in dealing with the forms of abdominal troubles enumerated below, and what would be the outcome of the various methods of treatment aside from operation?

In many of these troubles an intelligent patient could very reasonably decline operation, since a large proportion of physicians are unpronounced in their views in regard to the best method of surgical procedure, many others openly condemning any surgical interference whatever. Indeed, there are many cases, such, for instance, as cystoma and fibroma, where the question of operation in the minds of many conscientious physicians is at least debatable. Granting, however, that operation in these cases is proper, and yet the patient refuses to accede to it, after a full and fair statement of facts for and against it, the patient still desiring to retain the services of the surgeon of her choice, what line of treatment will best conserve the life of the patient and offer the best chances of recovery? Take, for instance, carcinoma of the cervix, womb, or appendages; here many advanced surgeons recommend operation in the early stages, claiming good results, while others, equally honest, condemn all interference where malignancy exists. Thus the patient is thrown upon her own resources to decide whether or not she will accept an operation if recommended. Suppose she refuses, what then are the surgeon's resources, or what can he offer that will aid her in her struggle for life?

Fibrous tumors of the uterus and internal viscera.—Only a few years ago the profession was almost unanimous in the belief that the expectant plan of treatment of these forms of surreptitious growth was the best and safest for the patient. Ever and anon there would be a voice raised urging interference in some form, but until Bantoc and Apostolli came on the scene there was no apparent movement in this direction. These two men, advocating different methods, soon procured a following, each advocating the theories of their leader and as bitterly denouncing the methods of the other. However, the balance has long since turned in the direction of surgical

interference, and now, when a patient comes to the gynecologist with a bleeding fibroid or a soft myoma—if there is great bodily disturbance, if the tumor is very large or of rapid growth, or if the hæmorrhage is sufficient to make the patient's life useless to herself and family—she is readily advised to submit to an operation. If this then is refused, what course is the conscientious surgeon to pursue?

Cystoma.—While these growths as a rule can truly be called benign, yet so many of them, from complications and accidents which so often arise, as also from the wear and tear they produce upon the system, are the cause of much evil and many unnecessary graves, attributed to the dispensation of Divine Providence, so called, by their neglect. No gynecologist will now advise other methods in preference to the knife for a sure, comparatively safe, and speedy deliverance of his patient from any of the forms of this trouble. But if this is refused, what then shall he do?

Ectopic pregnancy, pus tubes, ovarian abscess, puerperal sepsis, and septic peritonitis.—These fearful conditions are grouped together, not that they are similar in their pathology or causation; but from the fact that they need generally the same plan of treatment for their cure and if neglected or mismanaged the same result, death, usually comes to all sooner or later. However, this is not a result without exception, for I have had cases of each of these where operations have been advised and urged, and still declined, and at last my patients have recovered; in some cases perfectly, in others only partially I shall not give histories of these cases here, as they do not properly come under the title of my paper, but will probably come under the discussions which may follow. But they are on my notebook and they are cases to bear evidence that the surgeon's skill and resources do not end with the knife, but that his knowledge and good judgment are storehouses whence he may draw supplies with which to combat diseased conditions even though his best and safest plan of treatment may be denied him.

Thus, then, while I advocate early interference in all such cases as soon as discovered, rapid operations with a minimum of anesthesia, careful work with exact methods, I do not hold that this is the surgeon's only hope or his only means of meeting these troubles, and, therefore, if the use of the knife is denied him, that all hope and all other sources of help are *nil.* If in these cases operation is denied, what is the best treatment left at our hands?

Diseased ovaries and tubes, with displacement of uterus, prolapsed and adherent ovaries, are conditions oftenest met with by the gynecologist. They are common to every community, and they occur in so many forms and conditions, with varying severity, that it is hard to classify them. They form a large portion of the ills of womankind, and to a surgeon they present features and conditions that demand careful and conscientious investigation. A woman with an adherent, prolapsed ovary is often more crippled than one who has a fibroid as large as her head. Her life is made a burden to her, and, if a laboring woman, she is unable to help those dependent upon her for aid. Of all the patients who consult the gynecologist, those suffering with the milder forms of tubal and ovarian trouble give most solicitude. The question so often arises, What is the best thing for this or that patient in view of her condition and environments? And then, if operation be refused, after being deemed best and advised, what is the best line of treatment for those conditions?

I will not enumerate more of the troubles that are the inheritance of our countrywomen, but will leave the subject with those already enumerated. These are the ones most frequently met with, and to treat which we are called upon oftenest.

Taking the ground that the patient has the right to refuse or accept operation at our hands, the question in these cases arises, what are our resources? Are they limited to the knife, or have we now as we had before the knife was brought into general use, other sources from which to draw help for those thus afflicted? Have we not ever-increasing knowledge to guide and direct us in more scientific and intelligent management of such cases, so that if at one stroke we may not rid a patient

of her trouble by an operation, can we not at least make her comfortable, and little by little bring back some of her wonted strength, and hold at arms' length, at least for a season, the dread destroyer?

This, then, is the object of my paper: To obtain from this learned and honorable body of professional gynecologists the answer to my question at the heading: "When operations are declined, What next?"

SHORTENING OF THE ROUND LIGAMENTS IN RETRO-POSITION OF THE UTERUS.

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In the July (1886) number of the Montreal Medical Journal, I reported a case of retro-position of the uterus which had resisted all other forms of treatment. The patient was found to be a confirmed invalid, unable to leave her house. The result of shortening the round ligaments in this case was good. It was the first case reported of the operation performed in this country. The patient has enjoyed excellent health ever since, now five years, and as my further experience since that operation has borne good fruit, I feel I am justified in repeating the concluding sentences of that monograph with the same convictions as I then wrote it. The words run thus:

I am firmly convinced that the day of treatment of retro-displacements and prolapse of the uterus with pessaries is fast drawing to an end.

Since the publication of the paper referred to, I have, with all the care and energy I could command, pursued the line of action I had thus begun for the relief of this most distressing condition, and I can confidently assert that my expectations of success have been more than realized. They have been acknowledged by all who have been interested in this work, no matter how skeptical they were at first. The past history of my clinical work in this sphere will be expressed with extreme brevity; neither will I take into consideration other methods practiced by eminent and respected surgeons for the relief of the lesion in question, because I believe them to be more difficult, dangerous, and less efficient in obtaining ultimate good results. It should be a solid dictum in surgery of the present day that no man should open the peritoneal cavity to cure that which can be cured without. To be still more terse, if gentlemen who open the peritoneal cavity to suture the uterus to the anterior abdominal wall as a routine practice, had to decide in the case of their own wives between the intra and the extra peritoneal operation, I think their decision would be rapidly arrived at.

Three years ago I published a record of 20 cases, and two years ago I published a further experience of 52 cases, with results (Montreal Medical Journal, April, 1890) so satisfactory that I have been performing the operation up to the present time in every case of retro-position where the uterus was not firmly locked down in the pelvis by strong inflammatory adhesions, and it is a continuance of this experience (in all, 86 cases) which I wish to make the subject-matter of this paper.

Let us now consider the cases which are suitable for relief through the agency of this operation. All cases of backward displacement of the uterus, with or without descent, in short, whenever the uterus is so placed as to receive the intra-abdominal weight upon its anterior face, the patient being in the standing or sitting posture, the strain upon the broad ligaments under these circumstances is very great and continuous, giving rise to the majority of local and reflex symptoms complained of. It will be understood when we draw the uterus strongly forward, and allow the intra-abdominal weight to fall into the posterior segment of the true pelvis, it will

tend to float the uterus forward and upward, Douglas', and the lateral pouches receiving and supporting the weight in the manner in which they were originally intended. In the normal condition, the function of the round ligaments is unquestionably to maintain the uterus and broad ligament in this state of forward inclination, thus forcing the abdominal contents into the larger and stronger segment of the pelvis. Again, when the uterus and broad ligaments are held well forward by the round ligaments, the bladder is protected from direct intra-abdominal pressure and can rise without hindrance in the anterior segment of the pelvis during diastole. On the other hand, when this organ is dragged backward and downward to receive the full force of the pressure from above, we can understand the great difficulty it will have in performing its normal functions. Reasons of this nature will no doubt tend to explain to us the distressing bladder symptoms complained of by some patients afflicted with retro-position of the uterus.

In determining whether the uterus is fixed in the pelvis or not, we should never form an opinion unless we fail to antevert it while the patient is under ether. We have experienced many cases where it was impossible by all known methods to influence the postition of the uterus without causing unwarrantable suffering, without the aid of the anæsthetic, and it is surpising how easily its position can be changed when once the patient becomes profoundly anæsthetized. But, supposing that it is found impossible to change the position of the uterus under these circumstances, we must not entertain the operation of shortening the round ligaments, but advise abdominal section as the only means of offering relief, in view of finding that the appendages have been primarily the seat of disease.

Dangers of the operation.—There is only one accident which can happen after this operation that is peculiar to itself, this is hernia; but from the improved methods which I will presently detail it should not ever occur. When we made large wounds and disturbed the external inguinal opening, in vaguely looking for something like the ligament, it was no wonder hernia followed. Suppuration and sepsis may, by possible accident, occur in general hospital practice, but should never occur in private.

Duration of the operation.—It should not take more than ten minutes for each side, from the beginning of the incision to the closure of the wound. Lately I have accomplished the full work over each side, on an average, in about six minutes,

Method of performing the operation.—In regard to this question, I would say that it involves more in its individuality than any other operation. I have never been satisfied with methods taught by Alexander of Liverpool, Polk of New York, and others, and have held that the canal should not be opened or disturbed in searching for the ligament. When once the canal has been opened and the contents disturbed, it becomes a matter of mere accident our finding the structure sought for. An irreparable injury is done to the resisting qualities of the inguinal opening. The canal is not a hollow tube, containing only the round ligament, it is a solid structure, firmly packed with adipose and connective tissue, intended to fulfill a definite function, and we should not disturb them. These principles have guided me of late in performing the operation, and instead of opening the canal I simply make traction upon the fascia covering the external opening until I can see the ligament as it splits up to form this fascia. This method, if carefully carried out, is the most scientific, rapid in performance, and successful in results. When the fascial end of the ligament has been found, very careful traction should be made upon it by means of hæmostatic forceps until it begins to show some increase in size. It now may be seized with the fingers, the nerve carefully sought for and divided. Traction should be continued as long as the ligament freely runs. The sutures should then be passed from side to side of the wound, including the pillars of the ring and half of the ligament in their bite. I use silk worm gut of salmon size, and find the needle more accurately and rapidly passed by sense of touch than by sight. Two sutures are all that should be required in each wound. A small cat gut drain may be used in each wound for

forty-eight hours if thought necessary. The dressings are not disturbed until a week or so after the operation and the sutures are not removed until the third week. The patient should be cautioned against lifting or doing any work at her own home for at least three or four months after the operation. There are three important standpoints from which to regard this operation, viz:

First. Does the uterus remain permanently forward?

Second. Does the halvings of the uterus and appendages forward afford relief to the series of grave symptoms complained of by the patient?

Third. Does the shortening of the ligaments interfere with the progress of future pregnancies, and after convalescence from these pregnancies does the uterus return to retro-position.

First. Yes; the uterus and appendages remain permanently forward. I have had two cases where the uterus became again retroverted some months after the patients returned to their homes. In both of these cases only one ligament was shortened. In one of these cases I had opened the canal, but failed to find the right ligament. When the patient left the hospital the uterus was well forward, but it afterwards swung round to the shortened side, and dropped backward into the pelvis. In the other case the patient took ether very badly, and my anæsthetizer warned me not to proceed. This uterus also dropped somewhat backward, but not so far as it originally was; the patient, however, became much improved in health. Since this experience I have always insisted upon operating upon both sides before the patient was returned to her home.

In regard to the second proposition—the relief of symptoms through the agency of the operations—I can only say that no procedure has given me more satisfactory results, and it has been especially so in regard to the relief of distressing reflex nerve symptoms, induced by long continued chronic invalidism, and I do not know that such good results were attained in every case through the agency of this operation alone, as I had in a large majority of cases performed excisions of the cervix and colporrhaphy at the same sitting, which should always be done in suitable cases, but I have had no failure to relieve symptoms in cases of unmarried young women with retro-displacement. In passing, I may here state that this form of displacement is very much more common than is understood in young delicate girls who are engaged in the performance of men's work to obtain a living.

In regard to the last proposition—the influence of the operation upon future pregnancies—I can confidently say that it has none but the most happy. I have confined personally a few cases upon whom I had previously operated, and in every case pregnancy in its entire course was a happy one, and in no case did the uterus drop backward after convalescence had been passed through—it remained anteverted.

THE DORSAL DECUBITUS AFTER CONFINEMENT AND MISCARRIAGE AS THE COMMONEST CAUSE OF RETROVERSION OF THE UTERUS WITH FIXATION.

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After confinement and miscarriage the uterus is usually heavy, weighing from 22 to 24 ounces, and is therefore especially subject to the laws of gravitation. This alone would be enough to make the heavy fundus fall toward the hollow of the sacrum, but, as if that were not enough, the attendant, with or without the patient's or her friends' solicitation, applies a binder with all his strength, which forces the fundus still further downward and backward.

In addition to the binder a folded towel is often placed over the fundus and under the binder, for the alleged purpose of preventing relaxation of the uterus and hæmorrhage, and which still further forces the fundus down into the hollow of the sacrum.

During the progress of pregnancy the round ligaments become lengthened, owing to the rising of the uterus in the abdomen so that at the end of pregnancy they attain at least the length of 8 inches, namely, from the spine of the pubis to the internal abdominal ring, and from there between the folds of the broad ligament to near the horns of the uterus. From the sixth to the ninth month the uterus is so large that it no longer requires the aid of the round ligament to prevent it from retroverting, being held in position by the relations of its conical shape to the abdominal wall. The round ligaments have therefore little or nothing to do, and probably become weak for want of use. In the savage woman, who probably used to walk with her baby strapped on her back immediately after the confinement with her body leaning forward, gravity would carry the fundus forward against the symphysis pubis, bringing the points of attachment of the round ligament the nearest possible to each other, and consequently in the most favorable position for the natural shortening of the ligaments.

By ordering or allowing the patient to remain upon her back after delivery or miscarriage, the heavy, unsupported fundus gravitates onto the lumbar vertebræ, and as it involutes it gradually sinks into the hollow of the sacrum. Here it receives the intra-abdominal pressure on its anterior surface and at the same time presses upon the rectum like a valve so that the more the patient strains to move the bowels the tighter it closes the intestinal canal. Besides that, the uterus probably presses upon the uterine veins, thus causing its own passive congestion. The cervix being fixed by the utero-vesical ligaments which are not stretched by pregnancy, the uterus thus assumes the position of a bottle erect with its mouth uppermost, in which the lochial discharge accumulates until it overflows or is expelled by contractions. If the discharge becomes inoculated with microbes, the conditions for fermentation are very suitable. Unfortunately, the bottle has two holes in its fundus, namely, the fallopian tubes, through which the fermenting liquid leaks into the cavity of the pelvis, setting up a local peritonitis, which may be limited to the surface of the ovary and tube, but more often extends over the posterior surface of the uterus. In the first case the tubes and ovaries are glued together and in the second the posterior surface of the uterus is glued to the pelvic peritoneum covering the rectum. Generally the patient recovers from such an attack with the ovaries, tubes, and uterus all glued together in Douglas's cul-de-sac, from which it is rarely possible to detach it by even prolonged massage or any other treatment short of abdominal section, for in such cases, of course, Alexander's operation is out of the question. Such a condition of the uterus and appendages generally renders the woman a lifelong sufferer, menstruation is rendered difficult, locomotion painful, coitus unbearable. Owing to the obstruction of the venous circulation, the lining membrane becomes fungous and the hæmorrhage becomes profuse, until at last the patient prays for operation or death.

In the writer's opinion, this state of affairs is absolutely preventable by keeping the patient on her back or on her side after miscarriage or confinement, and by allowing her to sit up on a chamber and to lean forward while evacuating the bladder and bowels, so that the intestine may fall down behind the fundus, and so that the intra-abdominal pressure may fall on the back instead of on the front of the uterus. Uterine drainage is thus greatly favored, and if infection of the lochiæ should unfortunately occur, the patient may escape septic infection, as well as local peritonitis. Even if, as some maintain, all the discomfort accompanying retroversion with fixation be due to endometritis, this in no way weakens the force of my contention, for it is well known that defective drainage is one of the principal causes of this disease.

While the dorsal decubitus is exceedingly uncomfortable and trying to patients, it has nothing to recommend it. The idea originally was, no doubt, that it would prevent flooding, but now we know that any hæmorrhage which would be increased by the woman moving freely in bed would be due to a badly-lacerated cervix; we

would accordingly draw down the cervix and put a stitch around the severed artery, and at the same time repair the tear. No amount of rubbing of the abdominal wall against the uterus would make the latter relax, for it is precisely such rubbing of the uterus, or the artificial imitation of it with the hand, which we find most effective in securing good contractions. The danger of post-partum hæmorrhage, moreover, is a chimera which is growing less and less the more we avoid all those forms of injudicious haste, such as rupturing the membrane when dilatation is only half complete, tearing out the placenta while the patient is under profound narcosis, and using the forceps when there are no pains, or long before the time for natural delivery has expired.

This point illustrates the interdependence between obstetrics and gynecology, and gynecologists throughout the world can not too strongly urge the accoucheur to instruct his patients on the importance of the fact that the dorsal decubitus after confinements and miscarriages is the commonest cause of retroversion.

DU CURETTAGE DE L'UTÉRUS DANS LES CAS D'INFECTION PUERPÉRALE ET DU DRAINAGE DE CET ORGANE.

Par le Dr. LÉON AUDAIN.

[Présenté par le Dr. V. L. Gilles, Port-au-Prince.]

La femme V., âgée de 35 ans, accoucha pour la huitième fois le 17 décembre 1891. Nous ne fûmes appelé à lui donner des soins que le 25 décembre. On nous apprit que l'accouchement fut normal et on nous affirma que le placenta fut expulsé dans sa totalité ainsi que les membranes.

Les précautions antiseptiques, ayant été négligées, la fièvre s'alluma pendant le quatrième jour; dès ce moment, les personnes de son entourage remarquèrent que les lochis avaient une odeur fétide.

Lorsque nous la vîmes pour la première fois, le huitième jour après ses couches, cette femme avait un subdélire assez marqué. La température était 40.3°; le pouls donnait 130 pulsations par minute; les vomissements étaient fréquents; la face amaigrie, les yeux excavés, jaunâtres; le ventre ballonné, extrêmement douloureux à la pression.

Le toucher vaginal nous montra l'utérus volumineux, douloureux, mobile; cependant en rétroversion très marquée. Le col, également volumineux, offrait au doigt de multiples bosselures; son orifice était largement ouvert; on pouvait y introduire largement l'index.

Les culs-de-sacs latéraux, les culs-de-sacs antéro-postérieurs étaient libres; relachement des ligaments suspenseurs de l'utérus et des parois du vagin. Il s'écoulait de la vulve un sang noir, poisseux et s'en dégageait une odeur horriblement fétide. On nous apprit que depuis son accouchement, la malade avait eu plusieurs reprises de perte de sang considérable.

Dans les circonstances aussi graves, nous jugeâmes une intervention indispensable; nous pratiquâmes un curettage complet de l'utérus. La fièvre, dès ce moment, baissa sans disparaître, cependant. Le pansement intra-utérin (gaze iodoformée) et vaginal ayant été enlevé, nous fîmes chaque jour une grande injection intra-utérine.

Le soir du deuxième jour la température était de 38.8°. Les hémorrhagies avaient complètement disparues.

Le matin du troizième jour, température 38.4°; le pouls était à 120. Nouvelle injection intra-utérine, nous remarquâmes que la gaze qui se trouvait dans le vagin était imbibée d'un liquide brun jaunâtre, mais sans odeur. La cavité utérine mesurait 11 centimètres. Cette fois nous n'avons pas introduit de gaze iodoformée dans la cavité utérine; le soir la température est de 38°.

Le quatrième jour nous faisons une nouvelle injection intra-utérine dans les mêmes conditions; nous remarquons cette fois que la gaze qui se trouve dans le vagin est presque sèche, sans odeur. Par contre, lorsque nous introduisons le spéculum, nous écartons les parois vaginales l'une de l'autre, nous voyons le col utérin. Il s'écoule de la cavité utérine 3 à 4 cuillerées à soupe d'un liquide couleur chocolat, légèrement jaunâtre, un peu filant, mais sans aucune odeur. Nous nous contentons de remplir le vagin de gaze iodoformée.

Le soir du quatrième jour la température est de 37.3°.

Le lendemain matin du cinquième jour nous remarquons que le pouls est tombé à 100, et que la température est de 37°; nous nous dispensons, cette fois, de faire une injection même vaginale.

Le sixième jour le pouls est remonté à 120; la température est de 38.03°. Soubçonnant quelque chose d'anormal, nous enlevons la gaze qui se trouve dans le vagin, elle est légèrement humectée d'un liquide jaunâtre, mais cette fois fétide. Le phénomène que nous avons observé deux fois avant en introduisant le spéculum se reproduit et il s'écoule un flot de liquide extrêmement fétide; nouvelle injection intra-utérine. Le soir 37.6°.

Le septième jour, température 37.4°; injection intra-utérine.

Le huitième jour, bien qu'il n'y ait qu'une température peu élevée, nous nous trouvons dans la nécessité de faire une nouvelle injection intra-utérine.

Les longs pansements répétés étant non seulement désagréables, mais fatiguants pour la malade, nous nous décidons le neuvième jour de faire le drainage de la cavité utérine, espérant de cette façon livrer un libre passage au liquide et nous opposer aux réactions putrides. Des circonstances en dehors de notre volonté nous empêchent de mettre ce jour même notre projet en exécution. Nous nous contentons seulement de nettoyer la cavité utérine.

Le dixième jour après avoir fait une cautérisation avec de la teinture d'iode, nous introduisons jusqu'au fond de l'utérus, qui mesure 10 centimètres de profondeur, un drain percé de nombreuses fenêtres. L'introduction put être faite au moyen d'une pince longue; elle fut facile, l'orifice du col n'était point encore revenu sur lui-même. Comptant sur le retrait du col, nous ne plaçâmes aucun fil fixateur. A partir de ce moment, nous supprimâmes tout pansement et nous ordonnâmes de faire trois fois par jour une injection boriquée de 3 litres dans le vagin; la température était de 37.7°.

Le onzième jour nous apprenons que malgré toutes nos recommandations, aucune injection n'a été faite pendant toute la journée et toute la nuit qui ont suivies l'introduction du drain. Nous constatons néanmoins que le pouls est à 90 et la température 36.6°. Ce que l'on n'avait jamais observé jusqu'à présent.

Le linge qui avait été placé devant la vulve est souillé de nombreuses taches jaunes, légèrement brunâtres, et le vagin est rempli d'une sécrétion semblable.

Par le toucher, nous constatons que la sonde occupe exactement la même situation qu'elle se trouvait la veille.

Nous recommandons de faire les injections ordonnées.

Le douzième jour les injections ont été faites la veille régulièrement; l'eau de l'injection faite dans la soirée contenait une grande quantité de matières glaireuses muco-purulentes. Celle de ce matin, au contraire, était presque pure. L'examen de la toile qu'on avait placée au-devant de la vulve nous montra qu'il s'est écoulé depuis hier soir une très faible quantité de muco-pus.

Par le toucher nous constatons que le drain est descendu dans le vagin d'environ 1 centimètre à 1½ centimètre. L'état général fut considérablement amélioré; l'appétit est revenu ainsi que les forces; la malade dort bien depuis trois nuits. Le col de l'utérus a beaucoup diminué; sa surface s'est recouverte d'épithéliums; l'orifice paraît se resserrer sur le drain; néanmoins, le calibre n'est pas obstrué. Nous faisons continuer les injections vaginales.

Cette observation mérite qu'on s'y arrête; il est de notoriété commune que le curettage est une excellente opération dans les cas d'endométrites hémorrhagiques. On a signalé également les heureux résultats obtenus par ce procédé dans les métrites post-puerpuérales. Cette observation néanmoins est loin d'être admise par la majorité des accoucheurs, lorsque, dans les jours qui suivent l'accouchement, il se produit des phénomènes d'infections; soit par rétention partielle du placenta et des membranes, soit par rétention des caillots et du liquide dans la cavité utérine. Nous avons eu l'occasion d'intervenir de cette façon plusieurs fois pendant notre internat à la Maternité de la Pitié, et toujours nous avons eu à nous louer du curettage dans les cas de putréfaction de produits retenus dans l'utérus.

Nous nous rappelons un autre cas; celui d'une jeune femme qui s'est présentée à nous avec une température de 40°, chez laquelle un œuf de trois mois, ouvert depuis plusieurs jours, s'était putréfié dans la cavité utérine. Le col était revenu sur lui-même, et s'opposait aussi bien à la sortie de cet œuf qu'à l'introduction d'une sonde utérine; le jour même de son entrée dans le service, nous dilatâmes l'utérus au moyen d'une tige laminaire, et après avoir décollé la portion adhérente de l'œuf, nous fîmes un curettage de l'utérus. Le lendemain, la fétidité avait complétement disparue et la température ne s'élevait pas au-dessus de 36.8°, et six jours après la malade était guérie sans avoir eu la moindre élévation de température. Le cas actuel offre avec le précédent une certaine divergence qui explique justement le résultat différent obtenu par le curettage.

Chez notre seconde malade, des grossesses multiples avaient fatigué la matrice et prédisposaient la malade à une sorte d'inertie secondaire; de là les hémorrhagies considérables qu'on a observées dans les 8 jours après l'accouchement.

La situation déclive du fond de l'utérus retroversé, la prédominance de la contractilité des fibres circulaires du col avaient favorisé la rétention dans l'utérus des caillots et du sang; enfin, le refus de prendre même des injections vaginales avait déterminé la putréfaction de ces produits retenus; d'où frisson, fièvre intense, l'état septicémique.

Le curettage, en débarrassant l'utérus des caillots qui l'emplissaient, et en permettant de faire une asepsie complète de cette cavité, devait d'une part éveiller la contractilité des fibres utérines, d'autre part s'opposer à la résorption des produits putrides. A ce double point de vue, le curettage a donné tout ce qu'il pouvait donner: cessation des hémorrhagies et disparition de la fétidité de l'écoulement. Avec un utérus jeune, vigoureux et bien placé, la fièvre est sans nul doute disparue, comme il nous a été permis de l'observer dans maintes circonstances. Mais cet utérus était loin de se trouver dans de pareilles conditions. Tant que la gaze introduite dans sa cavité servit pour ainsi dire de drain, aucun phénomène de rétention vraie ne fut observé, les liquides s'écoulant en grande partie dans le vagin. Mais lorsque nous voulûmes laisser agir la nature, il nous fut facile de constater son impuissance. L'inertie du corps persistant, nous eûmes de nouveau une rétention des liquides de l'utérus (sans muco-pus) qui ne tardèrent pas à se putréfier de nouveau. Nouvelle ascension thermométrique, fétidité de ces produits.

Pour éviter les injections intra-utérines répétées qui fatiguaient la malade, il fallait trouver un moyen d'évacuer les sécrétions utérines: le drainage de la cavité nous paraît être le procédé le plus simple. A cet effet, nous avons introduit un drain, dans les conditions que nous avons spécifié dans le cours de l'observation. Le drainage de la cavité utérine est un procédé nouveau qui, nous le croyons par le résultat que nous avons obtenu, rendra de réels services.

Cette petite opération sera-t-elle toujours d'une exécution facile? nous sommes porté à le croire, dans certains cas du moins; et ces cas seront justement ceux où le drainage sera indiqué. En première ligne, nous plaçons les *inerties utérines* secondaires à l'accouchement, où la cavité utérine est encore largement dilatée, où l'orifice interne n'a pas encore atteint sa résistance normale, où l'orifice externe est large-

ment entr'ouvert, et où le conduit qui les sépare n'existe, physiologiquement, qu'à l'état de vestige.

En second lieu, le drainage pourra être avantageusement utilisé à la suite du curettage, pour peu que l'utérus soit en rétroversion ou en rétroflexion: ce sera un moyen sûr d'éviter l'accumulation des liquides dans le fond de l'organe.

Le drainage supprimerait l'introduction de gaze dans la cavité utérine, et permettrait, sans violenter l'organe, d'y porter les substances antiseptiques et les caustiques. Pour cela il suffira que le drain ne soit percé de fenêtres que dans sa partie utérine: une sonde ordinaire en caoutchouc remplirait très bien ce but.

Mais dans certains cas ce drainage sera sinon impossible, du moins très difficile. Ces cas, on le comprend facilement, sont ceux où le canal cervical est étroit et la cavité utérine peu dilatée ou infléchie sur elle-même. La difficulté n'est pas insurmontable: les sondes en gomme ou en caoutchouc légèrement durci étant éminemment flexibles et prenant la forme et la direction des conduits dans lesquels on les fait pénétrer. Nous avons comme preuve la mensuration des utérus fibreux où l'hystéromètre est immédiatement arrêté, tandis que les bougies de gomme passent avec la plus grande facilité.

Dans les cas, du reste, où le drainage sera indiqué et où le col s'opposerait matériellement à l'introduction du drain, il suffirait de faire la dilatation.

Cette observation a été prise à la fin de l'année 1891, et nous nous proposions de la communiquer aux sociétés savantes. Mais nous négligeâmes de le faire immédiatement. Nous avons sur ces entrefaites appris que le docteur Chéron, de Paris, venait de publier un ouvrage sur le même sujet. Nous sommes enchanté de voir que la même idée nous soit venue presque en même temps malgré l'énorme distance qui nous séparait. C'est une preuve que le drainage a de réelles indications.

On a pu voir cependant par une de nos communications que nous avons cherché à simplifier la question de l'antisepsie et des pansements intra-utérins, et que nous avons adopté les instillations intra-utérines. Il n'est pas moins vrai que le drainage dans les cas d'utérus volumineux en forte rétroversion, ayant par conséquent une tendance à conserver les liquides pathologiques qui s'y produisent, rendra de réels services.

THE OMENTUM AND THE RÔLE IT PLAYS IN OPERATIVE WORK UPON THE ABDOMEN.

By JAMES F. W. ROSS, M. D., Toronto, Canada.

Many of you may think the title of this paper peculiar from the fact that it may refer either to a paper on physiology, on anatomy, or abdominal surgery. I do not claim to be either a physiologist or an anatomist, but, as an abdominal surgeon, feel that we should all know more of the first structure we meet after the knife has cut through the peritoneum. The omentum has been neglected. Being, as we are, unaware of its function, we are constantly dealing with a something about which we know very little, and this ignorance may in many ways affect the results of our operations. I do not expect in this instance to arrive much nearer the conclusion, but desire to give you the outcome of some little thought on the subject. My intention is to take the question up as follows: First, the comparative anatomy of the omentum; secondly, the comparative development of the omentum; thirdly, the structure of the omentum; fourthly, the functions of the omentum; and, fifthly, the diseases of the omentum. There is a dearth of literature upon this subject.

Comparative anatomy of the omentum.—The pleural cavity first becomes differentiated from the abdominal cavity in the mammalia. While there is no pleural cavity in the pigeon, the omentum is found as a fold of mesentery loaded with fat, covering the viscera behind the liver (Marshall & Hurst, Parker).

Wagner states that in birds the peritoneum does not develop true omenta. The intestine in birds is, however, invested by a peritoneal coat which follows its curva-

tures.* In the reptiles and birds the alimentary canal is invested by a peritoneal coat which generally follows all the curvatures of the intestine, but in the snakes the folds of the small intestine are united by fibrous tissue, and inclosed by a common sheath of peritoneum. This also happens to a certain extent in the horse, two folds of bowel being frequently supplied but by one coat of peritoneum. This occurs especially in the colon. This is an interesting fact when taken into consideration with the observations made by several surgeons who have observed a total absence of the peritoneum in the human being. This has been observed as a congenital condition as well as a condition following adhesive peritonitis. It proves conclusively that man can live after an obliteration of his peritoneal cavity.

A small and a large omentum traversed by elegantly disposed streaks of fat, as in the otter, is regularly present in the mammalia. The insertion of the great omentum departs most from that of the human adult, and resembles more that of the condition found in the human fœtus, that is, in the absence of any omental attachment to the transverse colon. Lumbar omenta occur in the rodentia; these project into the inguinal canal, and are to be regarded as elongations of the peritoneal or vaginal coat of the testicle. In the females the lumbar omenta are prolongations from the round ligaments of the uterus (as in rats). In the Ruminantia, the great omentum forms a veil over the compound stomach; in the Carnivora, it lies around the intestines (Wagner). (In this connection, to depart for one instant, it is interesting to note that there is no vermiform appendix in the horse, or in any of the ruminants or in the dog or pig.)

Packard in his Zoölogy, referring to the omentum of the cat, says that "it usually contains a great deal of fat; its principal function is supposed to be to prevent the loss of heat. The omentum is present in all mammals, but is least developed in Cetaceans, being most prominent in carnivora and ruminants." From the fact that the Cetaceans have so slight a development in the omentum, the theory of Packard that it is intended to prevent the loss of heat can scarcely be maintained.

In the higher fishes (the teleosteans) pyloric ceca are attached like a fringe at the junction of the stomach and the duodenum. Their function is still unknown, and it may be that as there is no omentum they take its place. These rudimentary omenta in fish lead one to believe that the omentum has some special function. The omentum in the rabbit is a special fold of peritoneum extending backward from the stomach, and loaded with fat.

Comparative development of the omentum.—From a close observation of the comparative development of the omentum it is readily seen that the fœtal and adult conditions vary. The fœtal condition is similar to that seen in the lower order of mammals; the colon in the fœtus is unattached to the omentum, and this attachment takes place subsequently. Whether the attachment has any special significance or not is a question that is difficult to decide. The lower mammals live with an omentum that has no such attachment. It is probable that this attachment with the colon is not of any special significance. The mesentery of the hind gut retains its primitive characters in vertebrata with a short hind gut. When that portion of the hind gut, which is known as the colon, increases in length, as it does in mammalia, the mesentery or mesocolon accompanies it, and is at the same time raised by one portion as far as the root of the mesogastrium, so that the two rise close together. This gives rise to that gradual connection between the mesocolon and the posterior fold of the mesogastrium which is seen in the primates, and which ends in the condition seen in man where the transverse colon is inclosed is the hinder wall of the omental sac. At the same time the anterior and posterior walls of the omental sac grow out, and the great omentum is formed consisting of lamellæ of peritoneum (Gegenbauer).

The development of the omentum seems to show conclusively that it is intended for some important purpose in the animal economy. If it were the result of a retrograde process as of the folding together of some membranes that had been previ-

* Anatomy of the Vertebrated Animals.

ously prepared for some other purpose, and had been left after that purpose had been fulfilled, we might conclude that it is of no particular value; but, as it happens that, as the stomach becomes more dilated and assumes more of the transverse position of the adult, it carries with it the mesogastrium from which the omentum is afterwards produced, we see at once that the omentum is a subsequent formation. About the time that this change in position of the stomach takes place, the mesogastrium is rapidly expanded and doubled upon itself so as to inclose a cavity, while a fold of the peritoneum, connected with the liver and arising from the ventral border of the stomach, which has now become the lesser curvature, contracts around the entrance to the omental cavity behind the stomach, and within the omentum so as to form a gastro-hepatic omentum and the foramen of Winslow. One of the best diagrams to show this development of the omentum I have copied from Landois and Stirling's work on "Human physiology," and this plate no doubt shows the correct view of the development.

The dorsal fold of the great omentum has not at first any connection with the transverse colon or its mesocolon, and there can be no doubt that it is only at a later period that it comes to be so closely united with them as to have given rise to the view that the transverse colon is inclosed between the two posterior layers of the omentum. This view is entirely erroneous and inconsistent with the history of the development of the omentum; what does happen is evidently a fusion of the dorsal or outer fold of the omentum with the upper layer of the mescolon, and this fusion takes place some time after fœtal life. The peritoneum in general is developed locally by superficial delamination from the mesoblast, and not from any special layer of formative tissue (Quain).

Structure of the omentum.—The structure of the omentum is very peculiar, and the only structures to which I can liken it are the "cerebral omenta," or the arachnoid with its fringes, the choroidal plexuses, and the "arthritic omenta," or the synovial fringes in the joints.

The works on anatomy seem to disagree as to the exact disposition of the membranes of the brain. Some describe the arachnoid as a membrane dividing the space between the dura mater and the pia mater into two spaces (and by doing this it certainly resembles an "omentum," and I have therefore called it a "cerebral omentum"), and others describe it as a serous membrane lining the outer side of the pia mater and the inner side of the dura mater, and thus they divide it into a visceral and a parietal layer. I believe, however, that the first description is the correct one, and the one accepted by modern anatomists. Composed, as the omentum is, of four separate and distinct layers, it must be intended for some special purpose. The vascular supply to the omentum is very great; there is no other membrane in the body better supplied with blood. Hanging down, as it does, one might almost look upon it as an "abdominal lung;" we have here a large efflux of venous blood, an immense capillary network with nothing between it and the cavity of the peritoneum but a one-cell-thick endothelium.

The mouths of the lymph spaces are constantly open and ready to drain away any excess of transudation from the capillaries that, after its transudation, becomes what is known as "lymph." These open spaces remind one of the condition present in the skin of the frog, especially that part of the skin covering the abdomen. A frog is said to absorb through these pores nearly half its weight of water within an hour. In the lung the structure is intended to bring the venous blood in contact with the oxygen of the air, and for this purpose the lung is constructed as it is. The omentum is likewise peculiarly constructed, and its purpose is in some way closely connected with its vascular and its lymphatic supply. The omentum is enormously supplied with lymph tracts; there is no other part of the body possessing a more thorough or peculiar lymphatic supply, and it seems rather strange to find this lymph supply so perfect in such a thin and apparently useless membrane.

Functions of the omentum.—Foster likens the peritoneal cavity to the connective-tissue spaces, and considers them all as the very commencement of the general lym-

phatic system. Into the serous cavities the plasma of the blood exudes and becomes lymph. Whether the epithelioid linings of the large serous cavities play any distinct part in regulating the transudation of serous fluid (that is, of lymph) into these cavities we do not know. Mucous membranes are not closed sacs; serous membranes are closed sacs, and they must be subject to some regulator of the amount of fluid contained in them. When diseased we at once find an abnormal collection of fluid, and when that collection of fluid is removed they return to a normal condition. Ordinary fluids that enter the tissues to keep them moist are deposited in them by an exudation from the walls of the capillaries; all surplus that is left after the requirements of the tissues have been attended to is returned by the lymphatics. In serous cavities this fluid is required for use in the cavity itself to permit of greater freedom of movement of the contents, to prevent injurious pressure, and probably to supply a certain amount of nourishment to the parts bathed in it.

One can scarcely believe that the omentum is intended to prevent adhesions of the intestines to the abdominal wall; for, if this were so, it should extend behind as well as in front. The omentum must be to some extent a protection to the intestines against injury by assisting them to glide away from the point of greatest pressure, and by preventing the formation of adhesions between the intestines and the abdominal wall. Were these adhesions to form, the intestines would be more liable to rupture during any sudden abdominal pressure. Although it is held by Foster that the villi of the choroid plexuses differ from the villi of the arachnoid in the fact that they are engaged in actively secreting fluid, they nevertheless play an important part in the regulation of the quantity of the fluid contained in the ventricles at any one time.

I have likened the omentum to the arachnoid and to the synovial fringes. There is one feature common to these three, namely, the deposition of fat. If the omentum were for the purpose of storing fat the storage should commence early, but it only begins after other tissues of the body have been fully supplied; and again, animals, such as those that hibernate, should be specially supplied with omenta, and these omenta should early put aside the fat supplied for the ensuing winter. The fat of the camel, though it does not hibernate, is stored in its hump, and in the frog in various parts of the body.

In the brain the pacchionian bodies, or glands, as they are incorrectly called, or, in other words, the villi of the arachnoid, appear to be intended for the purpose of relieving the subarachnoid space of too great a quantity of fluid, or in some way to regulate the difference between the small quantity of the fluid in the subdural space and the larger quantity of fluid in the subarachnoid space. These villi are composed of spongy, trabecular tissue, and fluid injected into the subarachnoid space filters through their walls into the subdural space, and can even be driven into the interior of the venous sinuses.

The adjustment between the normal and the abnormal quantity of fluid I believe to be controlled by means of the arachnoid and its plexus in the brain, by the synovial fringes in the cavities of the joints, and by the omentum in the abdomen. The bursæ and the sheaths of tendons, belonging as they do to the false serous sacs, need not be taken into consideration in the analogy, but the pleural cavity and the pericardium must be considered. I am unable as yet to understand how this regulation of the quantity of fluid is carried out in the chest unless in some way connected with the pump-like action of the act of respiration.

It was demonstrated by Cyon and Ludwig that when the depressor nerve was divided in the rabbit and stimulated at its central end, dilatation of the vascular district supplied by the splanchnic took place, and that district, as a consequence, held a very large supply of blood—so large, in fact, that other parts of the body were impoverished and the blood pressure, as a consequence, was diminished; but that after a time, by some compensatory action, this dilatation ceased and the blood supply again assumed its normal condition. One would think that it might readily

be demonstrated by experiment that the removal of the omentum would produce a condition similar to that produced when the omentum has become functionless by the invasion of a disease; but when such compensation as that just mentioned takes place, experiment is rendered more or less valueless.

Tait says that in patients suffering with peritoneal dropsy, due to disease which we now call peritoneal papilloma, a large number of cases will be found in which the effusion may be made to come and go as the observer wishes, by merely keeping the patient in bed or out of it. In others it can not be altered, and there are cases in which, on exploration, it will be found that the great omentum is chiefly or very largely involved. This is Tait's statement of the case, but I am not aware that it has been observed by any other observers. From my own experience I am unable to say that I have ever noticed this effect. I have seen many cases of peritoneal dropsy accompanying malignant disease and accompanying tubercular disease, and I have seen the ascites completely disappear in some cases of tubercular disease, but have never seen it disappear in cases of malignant disease. I have frequently seen it accumulate and disappear and reäccumulate in cases of heart disease.

When we have a collection of fluid in either of the three serous cavities of the body as a result of inflammation, a special set of symptoms are observed in each case. We have a peculiar slow pulse and slow respiration accompanying meningeal inflammation, the full pulse and the high temperature accompanying pleural and joint inflammation, and the peculiar thready and rapid pulse and low temperature accompanying the worst form of peritoneal inflammation.

I have seen the omentum so short that it was hardly worthy of the name, and I have seen it so long as to be very much in the way during abdominal operations, reaching far down into the cul-de-sac of Douglas, where it lay curled on itself. In one patient on whom I operated, who was suffering with symptoms of chronic pelvic inflammation, I found what I considered before operation to be a pus tube to be nothing more than the omentum curled on itself like a rolled pancake and tucked down into the cul-de-sac of Douglas. In another patient I found the omentum attached to an ovarian tumor and apparently infected with the gangrenous condition present in the tumor itself. I considered it advisable at the operation to remove this doubtful looking omentum, and did so by means of a chain suture passed across its surface about six inches below its attachment to the stomach. This procedure curled the end of the omentum together, and reduced its width to a very great extent. Some time after the operation the patient began to complain of pains in the abdomen, and noticed a hardness that was found to extend upward toward the wall of the stomach. I at first attributed this condition to the presence of a collection of fluid in the omentum, but how this collection of fluid was occasioned I could not satisfactorily explain to myself. I connected it with the ligation and removal of half of the omentum. As the patient went from bad to worse, I determined to do a secondary operation and to tap what I considered to be a cyst of the omentum. Serous fluid was found and evacuated by an incision made high up. The fluid re-collected, however, and I began to think that the case was probably due to an original condition of malignancy in the tumor. The tumor, at the time of its removal, did not appear to be of a malignant nature. The symptoms pointed, however, to the formation of pus. The patient lingered on for some months, and eventually an abscess opened through the line of the second incision, and she immediately regained her health. This case was one of cystic collection of fluid in the folds of the omentum, with secondary suppuration in the cyst.

From this case I was first led to believe that the omentum in some way controlled the intraperitoneal currents. About this time I read a paper of Tait's, in which he stated that he believed the omentum to be the arbiter of the peritoneal tides. A case was mentioned by Tait of a cyst, evidently composed of the lesser cavity of the peritoneum, removed from a patient who had acute peritonitis and in whose abdomen a common sewing needle was found. The irritation of the sewing needle and

the irritation of the silk ligature may have set up an irritation in the omentum that led to the formation of these cysts. In one case I found the omentum forced through the aperture, from which a drainage tube had been removed two days before. On removing the dressings I was amazed to find nearly 3 inches of omentum lying on the abdomen. It was thickened to a great extent and filled with a reddish serum, and apparently partially strangulated. I was astonished to find so much thickening in so short a time. One would almost have thought that it was endowed with some vermicular-like action and that it was able to move itself from place to place.

I have been interested to notice the manner in which the omentum seems to hasten to prevent the invasion of the general peritoneal cavity by some intraperitoneal poison. It seems to rapidly glue itself to the leaking pus tube, or the inflamed and leaking appendix, or the irritated and inflamed gall bladder, and thus to ward off a dangerous invasion of the system. It must in this way save many a life. It is like a man-of-war, ready to sail to any port in which there is impending trouble. Can it be that the omentum is used like the overflow sluices provided for mill dams, to provide an extra outlet for the stream when the torrent comes? The usual channel is sufficient under ordinary circumstances, but when inflammation occurs and fluid tends to accumulate, it seems as if the omentum rushes to the inflamed spot for a purpose. The immense lymphatic supply of this thin membrane must be able to carry off a great quantity of fluid in a very short time.

Irritative inflammation of the peritoneum is peculiar. When the omentum is artificially inflamed the epithelial cells proliferate, pus corpuscles form, the endothelial cells become spherical and prominent in their process of detachment from the fibrous trabeculæ. These endothelial cells become detached and are thrown into the general cavity of the peritoneum. As the process of repair goes on these endothelial cells become flattened and applied to the fibrous trabeculæ, the protoplasm becomes less granular, and they form an almost complete epithelial investment. The lymph cells are noticed subsequent to inflammation of the omentum accumulated around the vessels.

The omentum is more frequently found in hernial sacs than intestines, but this can be readily accounted for. We frequently find pieces of thickened omentum in the regions of either inguinal or femoral hernia, giving rise to the idea that perhaps we have to deal with an ovary in the inguinal canal or an enlarged and inflamed lymphatic gland. Such cases are at times very confusing. At the operation nothing but a small button of thickened omentum will be found in a small hernial sac, with a fairly tight constriction at the neck, producing the peculiar edematous condition of the omentum. It is only a few days since I removed nearly the entire omentum from the sac of an umbilical hernia. It had forced its way between the trabecule of the connective tissue in such a way that the sac was divided into subsidiary sacs, and the omentum was so firmly adherent that it could only be removed be tearing. While tearing the last portion I found that I had reached almost up to the colon. By the process of tearing so many shreads were left that it was necessary to ligate and remove almost the entire intestinal curtain. Though the intestinal curtain may be able to deal with a considerable excess of fluid that may collect within the peritoneal cavity as a consequence of inflammatory action, there is no doubt a point reached at which this task becomes more than it is capable of performing. The peritoneum becomes inflamed perhaps more frequently than any other serous membrane in the body. The attacks of inflammation in this membrane in some women are legion, recurring and recurring at frequent intervals, but without producing death. Inflammation of the membranes of the brain and spinal cord is a very serious disease, and slight inflammation seems to be followed by the most disastrous results.

When fluid is effused into the peritoneal cavity, and it is nearly always so effused even in attacks of very slight inflammation, this fluid seems to be readily absorbed, and the patient convalesces in a few days. I have on many occasions opened an

abdomen of a patient who had been suffering from some form of growth, and has for twenty-four or thirty-six hours previous to the operation been suffering with pain indicative of a slight inflammatory attack, and in each case I have found a small quantity of fluid free in the peritoneal cavity, the peritoneum itself injected and showing every evidence of slight inflammation. Had operation been delayed a day or two in these cases no doubt the fluid would have been absent.

Mr. Stenhouse, my clinical clerk, to whom I am indebted for assistance in reviewing the literature (meager as is) of the comparative anatomy of the omentum, in discussing the matter with me formulated several theories. First, is the omentum primarily needed for heat? This has been already disposed of in another paragraph. Secondly, has the omentum in its attachment to the stomach any special function connected with the blood supply to the stomach? This is a very difficult question to answer. It may be that it holds a surplus supply of blood during the process of digestion, and that such blood not being utilized as it is in other parts of the body, such as muscle and the liver and kidneys, deposits fats so frequently found in the omentum. This is especially found in people whose digestion is of the first order and who put on a fat supply elsewhere. Thirdly, have the additional omenta found in the most prolific class of mammals any connection with rapid reproduction? Were these only found in the female the question might be answered in the affirmative, but as they are found also in the male they can hardly be intended for this purpose. I leave the subsequent solution of these questions to others.

Diseases of the omentum.—Growths. The omentum is subject to various forms of growths—fatty tumor, dermoid tumor, malignant growths, simple and suppurating cysts, hydatid cysts, and fibroma.

Discussing the question of tumors of the omentum, one must be careful to differentiate those tumors that originate in the omentum itself and tumors that become secondarily attached to it.

Regarding wounds of the omentum, Greig Smith says that they are occasionally attended by free bleeding, and that this free bleeding may form a large hæmatoma between the layers. In such cases complete amputation of the omentum above the site of injury would be the best treatment. A small perforation without bleeding should be excised to prevent the risk of gangrene and the opening should be closed by a continuous suture.

Fatty tumors have been successfully removed from the omentum. Such cases are frequently supposed to be malignant until after a microscopic examination of the growth has been made. An interesting case was recorded by Roberts, operated on in the Woman's Hospital in Philadelphia.* The fatty tumor in the omentum in this case was accompanied by a collection of ascitic fluid in the abdomen.

Dermoid tumors, if we are to accept the view mentioned regarding the development of the peritoneum from the mesoblast, can not originate in the omentum itself. Sutton believes that there is no such thing as a true dermoid of the omentum. He believes that dermoids within the peritoneum only occur in women, and that all dermoids in men are extraperitoneal, and, further, that dermoids of the omentum are in reality dermoids of the ovary that have shifted their attachment.

Cornil and Ranvier state that primary carcinoma of the peritoneum commences in the omentum as encephaloid, or more frequently as colloid. Cylindrical carcinoma of the stomach, the intestines, the gall bladder, and the biliary ducts give rise to secondary nodules in the liver, but without involvement of its serous covering or of the peritoneum elsewhere. In cases of cancer of the peritoneum, such as that which may affect primarily the omentum or ovary, the omentum is always affected and the peritoneum studded with nodules that have a tendency to grow only toward the peritoneal cavity, and not to affect deeper tissues. A very remarkable case of cancer of the omentum was reported by Gross.† In this case the omentum, or a portion

* Medical News, August 22, 1891.

† Transactions of Pathological Society of Philadelphia, Vol. VIII.

of it, had apparently been protruded through an opening in the linea alba, and the portion thus protruded had taken on cancerous disease. A mass of cancer was found lying on the aponeurosis of the external oblique muscle and was connected by a rounded pedicle one-third of an inch in diameter. With the omentum the pedicle was ligated and the tumor removed. Shortly after ascites made its appearance. The patient died; no post-mortem was permitted.

Cysts of the omentum are more common perhaps than fatty growths or malignant growths. The cysts may be simple inflammatory cysts, suppurating cysts, or hydatid cysts. The pathology of these is not as yet well known. I show a diagram given with a case reported by Doran, operated on by Bantock. This cyst lay entirely between the two anterior and the two posterior folds of the omentum, with the mesentery of the colon and the ileum lying above and behind and below and behind. It was adherent to the mesentery throughout part of its extent. The woman was 58 years of age. The two anterior layers of the omentum that encircle the stomach with peritoneum were found intact. The adhesions commenced below where the two folds of the posterior layer encircles the colon, and the two layers of the anterior wall passed in front of the colon to reach the stomach. In this case nothing peculiar was to be noticed. In regard to symptoms, the patient suffered for years with what was supposed to be cystic disease of the ovary. She had been tapped several times; the fluid that was removed was dark and serous. The cyst proved to be entirely within the omentum; the fold of the mesentery attached to the ileum entirely separated the tumor from the pelvic organs, where the uterus, ovaries and tubes, and peritoneal folds were normal.

Wells* shows a diagram, that I have reproduced, when recording a case of cyst of the omentum operated on by him. The patient was a girl aged 4, who had a large stomach from infancy. This enlargement gradually increased and was accompanied by abdominal pains. The abdomen was found to be prominent below the navel and the prominent area was dull on percussion, and fluctuating. The drawing shows a peculiar laxity of the abdominal wall below and does not give one the idea either of the presence of pregnancy or of ovarian cyst; it has more the appearance of an abdomen filled with ascitic fluid. When lying on the back the fluid was found to be encysted; it did not rise in the loins as it would in ascites. The diagnosis was that of ovarian disease. The fluid drawn off was nothing more than water with a mere trace of albumin; it was tapped and soon filled again. The cyst never became tense, although it filled. This, I suppose, was due to the tendency it had to burrow up into the folds of the omentum. After its removal the child remained in good health.

The case mentioned in the fore part of this paper recorded by Tait, of a cyst of the omentum removed from a patient in whose abdomen a common sewing needle was found, might point to omental irritation as a cause of the formation of such a cyst. Cysts of the omentum seem to suppurate very frequently, and this suppuration is not dependent on any surgical interference.

Pain appears to be generally present in such cases. There seems to be greater movement upward than downward, and the movement is also lateral from side to side of the abdomen. The movements are synchronous with respiratory acts.

Hydatids of the omentum are not very common. An interesting case is recorded by Thornton. The patient had been pregnant for some months, and was suffering from an obscure abdominal tumor. She looked sallow, and had the appearance of one suffering from constant pain. Her health had not been good for three and a half years. She had a child three and a half years before. At that time she noticed a lump in the right side of the abdomen. As her size increased with pregnancy other lumps were felt in the lower part of the abdomen. The pain was continuous when Thornton saw her, and she was obliged to take sedatives. Emaciation rapidly increased. The pregnant uterus was found to be to the left of the abdomen;

* Brit. Med. Jour., June 14, 1890.

the masses to the right side had the indistinct sense of fluctuation; the pelvis was occupied by grape-like bunches of small round bodies lying behind the uterus. The tumor was supposed to be ovarian, and exploratory operation was decided on after consultation and carried out. Some of the consultants favored the induction of premature labor; others favored immediate exploratory operation. On making an incision, a white looking cyst adherent to the parietes came into view, and as it was impossible to reach above or below it was cut into. It had a rough surface and looked like those false cysts that are formed by peritoneal adhesions. The nodular parts were found to be separate hydatids growing in the omentum, and its whole lower half was fringed and hung with them, from the size of a hen's egg to that of a small marble. This condition affecting the omentum is an extremely rare one.

I have found no record of chylous cysts of the omentum, though such cysts are common in the mesentery. My references have been taken from the Index Medicus. Such cases may have been reported and have escaped my observation. If chylous cysts of the omentum do not exist, the fact would be an interesting one when taken in connection with the fact that they are common in the mesentery.

Fibroma has been found in the omentum. A case was reported in the Transactions of the Pathological Society of London, 1891-'92, Vol. 43.

Gangrene of the omentum.—A case of gangrene of the omentum has been mentioned, and a specimen was shown by Pitt to the Hunterian Society at the meeting on the 28th of March, 1889. Extensive sloughing of the omentum was found, and this had evidently set up a fatal peritonitis. The patient was a man who, while under the influence of liquor, fell in the road. It was not known whether he was trodden on by a horse or otherwise injured. A small tear was found in the omentum, from which no hæmorrhage had taken place. As a perforation was found in the ileum in this case, it is difficult to say whether the lesion in the ileum caused the gangrene in the omentum or whether the gangrene of the omentum was the primary lesion.

Obstruction of the mesenteric artery and vein has been noted (Path. Society Trans., Vol. 32), and was followed by an intestinal hæmorrhage. One can easily see how gangrene of the omentum might occur, and this fact is perhaps of considerable importance to the abdominal surgeon. I fear that sometimes we are tempted to remove the distal portion of the omentum after ligation of the part nearest the body at too great a length from the ligature, and thus to favor death of the distal portion.

Hæmorrhage into the mesentery has also been noted. This subject was brought prominently forward in 1881, when several cases were reported to the Medical Society of London.* As such hæmorrhage may occur in the mesentery, there is no reason why hæmorrhages may not also occur in the folds of the omentum. I have not seen any such cases reported, except as the result of injury.

Tubercular deposit frequently takes places in the omentum, but is then only part of the general tubercular peritonitis. It may be thickened so as to form a prominent hard tumor that may be readily felt by palpation over the abdomen, but, as it is accompanied by ascites, may give rise to the idea that the disease is malignant. Omental bands have been known to produce obstruction of the intestines. Such bands are perhaps among the common causes of internal strangulation. A coil of intestine has been known to slip through a tear in the omentum.

Inflammation of the peritoneum.—There is no doubt that in many cases of inflammation of the peritoneum the omentum becomes studded with colonies of leucocytes or small round cells that thicken it, and that also form nodules that can with difficulty be distinguished from the granulations of tubercle. Tubercle and malignant disease has a tendency to be deposited in this way in colonies, not only on the omentum, but over the entire surface of the peritoneum.

In a description of a cyst of the omentum Ransom describes the condition found by the microscope as clearly indicative of the inflammatory origin of the cyst. In reading the history of the case of Wells, one must conclude that, owing to the

* Lancet, December 1, 1881.

presence of the small fluid-like grapes, the cyst was undoubtedly of inflammatory origin. I have seen these fluid-like grapes in the abdomen on several occasions, and they have only been found in cases in which the parts were firmly matted by adhesions left by former attacks of peritonitis.* Peritonitis is a disease to which dogs are little subject. Even wounds which in horses and other animals result in inflammation of the peritoneum in the dog heal kindly.†

* See paper on "Cystic Disease of the Peritoneum," American Association Journal.
† Stables.
Illustrations not furnished.

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